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The CANADIAN FIELD-NATURALIST

VOLUME LIII

1939

THE OTTAWA FIELD-NATURALISTS' CLUB
OTTAWA, CANADA

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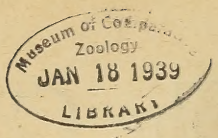

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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The Canadian Field-Naturalist

VOL. LIII OTTAWA, CANADA JANUARY, 1939 No. 1

THE THIRTEEN-STRIPED GROUND SQUIRREL IN MANITOBA

By STUART CRIDDLE

THE thirteen-striped ground squirrel, or as it is more commonly called, the striped gopher, *Citellus tridecemlineatus* (Mitchell)*, was one of the first Canadian mammals to make itself known to us, and that soon after we had pitched our tents on the 25th of August in 1882. Since then many thousands have passed through our hands and something of their life habits has been learned. Their summer and winter homes have been dug out and the depth to which they go ascertained. Their nests and stores have been examined, and a close study of their food and other habits made in the wilds while others have been kept in large study cages.

In the following notes I have attempted to give a summary of their life habits as recorded by us through the many years of our pleasant acquaintance with them. It will be seen that I have not drawn on the valuable works of other writers. My reason for this is that their observations have in most cases been made under slightly different climatic and food conditions from those prevalent in this locality and therefore I do not entirely agree with them.

As always, my hearty thanks are given to all members of my family for many years of valuable help, to Mr. Ronald Whitehead who is now taking great interest in mammalogy, and to Dr. R. D. Bird for many interesting trips into the wilds and for other help.

Distribution

While I am still unable to say what the distribution or where the northern boundary of this squirrel is in Manitoba, I have sufficient information to show that it occurs in all suitable parts of the province south of the following places: Sprague, Giroux, Winnipeg, Geyser, or slightly east of that village, on the Icelandic river which is some 70 miles north of Winnipeg. They have been found near McCreary, Dauphin, Swan River, on the east side of the Riding mountains, then north to a point on the Bell river some few miles east of Mafeking. This is the farthest north they have been found by us.

Although it is probable that they have and still are extending their original range to correspond with that of agriculture, we have little or no proof to show that this has been more than of a purely local nature. It might have been thought that the specimens taken at Geyser, McCreary and Bell River were recent migrants into those districts if we had not been able to show that the differences among them were sufficient to prove that they were indigenous to those districts or had at least lived in them for many generations before our records were made.

Description

The upper parts of the body, from the head to the tail, are divided by seven dark brown longitudinal stripes which are broken up by rows of light dots down their centers, and separated by six light buff stripes. The head is covered by a number of dark and light markings which are more or less a continuation of those of the back. There is a light ring about the dark eye, and the light buff of the cheeks is washed with varying shades of brown. The brown centre stripe of the rather long, slender tail is edged by a black band of light-tipped hairs and the lower parts of the body are slightly paler than the light stripes of the back. The dark and light stripes of the upper parts give a sunshine-and-shadow effect to the squirrel which makes it extremely difficult to see when it lies quiescent or is quietly moving about in its surroundings of prairie grasses and weeds.

Measurements

The measurements given are the averages of 30 fully adult males and 30 females, and of those of the largest of each sex. The three specimens from Geyser and the two from McCreary are given to show the marked difference between them and also between them and those recorded from Aweme The Measurements are in millimetres and weights in milligrams.

* For our species I have not used the trinomial, *tridecemlineatus tridecemlineatus* because the description given for it does not agree with the Aweme, Geyser or McCreary specimens, which may be found, when more information is gathered, to be geographical races of that species.

	Total Length	Tail Vertebrae	Hind Foot	Weight
Aweme				
Average ♂	275.5	100.7	39.4	163.86
Largest ♂	298	111	40	178.08
Average ♀	265.5	95.5	37.2	140.21
Largest ♀	272	99.5	40	154.56
Geyser				
Average ♂	297	116	40	180.75
Juvenile ♂	287	113	39.5	147.30
Average ♀	278	119	39.5	192.10
McCreary				
Average ♂	305	113	41	202.21
Average ♀	291	112	40	171.24

General Habits

This is the smallest of our Manitoba ground squirrels and is a true lover of bright sunshine under which it spends the greater part of its active life, gathering seeds, insects and other kinds of food for present and future use, keeping old holes in good repair and occasionally digging new ones, playing or chasing one another back and forth between the areas which they seem to consider their own, always keeping a sharp look-out for any one of the many predators which so largely prey upon them. Should something unusual appear or danger threaten they utter a rather pleasant, high-pitched, though soft trill or bubbling whistle of varying density which warns others of their kind and yet does not give their own position away for they are excellent ventriloquists. If one is put out of hiding by a dog which is only a few feet away the whistle of many bubbling notes so misleads and confuses the dog that more often than not the gopher reaches its hole without being seen.

My earliest spring record is March 29 which is fully a week earlier that the average date of their appearance above ground, The males always emerge from their winter holes some days before the females, and all my last autumn records are of males, showing that they are the last to retire for the winter. Our latest record was made on November 8, 1931. Another late record was the 2nd of that month. A rather unusual record was made on the 20th of October, 1932, when a fat male was seen running about on ten inches of fresh snow and was shot by my brother Evelyn. These records are exceptional for the majority have retired for the winter before the first of October.

Drinking

Usually when living in their natural surroundings these squirrels have no chance of procuring water other that that provided by rain and dew. However, when water is available they visit it daily during hot weather. We have often had them come to our bird bath during the summer and one that had its hole about 60 yards away visited the bath two or three times a day during the extreme heat of mid-summer and took a good drink each time.

Climbing

While these are true ground-loving squirrels they can climb stunted and rough barked trees. They make a practice of climbing among low chokecherry bushes for the cherries, the pulp of which is eaten and the stones stored away for future use.

Swimming

The striped ground squirrels are fairly strong swimmers and several have been seen crossing the Assiniboine River which is from 80 to 100 yards wide. The last seen doing so was on the 5th of July, 1935, when the river was high and running fast.

Fighting

The males do a considerable amount of fighting just before and during the mating season. A fight seems to be more in the nature of a wrestling match than anything else. I have never seen them attempt to use their teeth while fighting and wounds about the head are seldom found. However, wounds are often found on their hind quarters and tail. These are probably received during the vigorous chasings which take place at this time

Dusting

Rolling in dust, or dry sand, seems to be a common practice with most of the small animals and the striped ground squirrel is no exception.

Parasites

No study of internal or external parasites has been made by us. However, fleas are commonly found on the squirrel's body and in its nest, and mites occasionally so.

Large warble grubs were common during July and August in the years 1934, 1935 and 1936. The majority of them occurred between the hind legs and were much more common on young than on adults.

Sex

The work of recording the sex, relative age and number of mammals examined by us in a systematic manner was started in 1928. Since then among the great number which have passed through our hands are 2,161 striped ground squirrels. These are sexually divided as follows: 884 adult males, 250 juvenile males, 753 adult females and 274 juvenile females, or 1,134 males and 1,027 females. These figures would have led us to the belief that more males were born than females, if I had not recorded the adults and

juveniles separately, and if we had not known that the males were the first to emerge from their winter nests in the spring, were the last to retire to them in the fall, and that they were very much more active during the breeding season. These, then, are the reasons why there were more males recorded during the study than there were females.

When we examine the figures given for the juveniles we see that the number of young females was greater by 24 than were the males, while this is probably nearer to the truth than is indicated by the figures given for the total number of each sex, it is thought that the sexes are about equal in number at birth.

BREEDING RECORDS

While we had examined many pregnant females before 1912, we had not kept any but memory records of our findings but that year I began a more intensive study of the question and among many other breeding records secured that year were 25 of the squirrel. Since then we have steadily added to those records and now have brought them up to 269. After making a careful study of these records I have been unable to find anything which would indicate a yearly variation in the number of embryos carried. In fact they show that the birth rate has been practically the same throughout the 25 years of this part of the study.

The three columns of figures given below show the number of females examined, the number of embryos carried by each female, and the number of embryos for each class. At the bottom of the columns are the total numbers of females and embryos. These show that the average birth rate at Aweme is just over eight young per female.

No. Females	*No. Embryos*	*Total Embryos*
3	4	12
4	5	20
29	6	174
60	7	420
78	8	624
47	9	423
33	10	330
12	11	132
3	12	36
269		2,171

Like all our rodents that live in solitude during the winter and store food for their use during the many months spent in semi-hibernation, they rear only one litter of young a year. However, if the first young are killed when very small, their mother may have a second litter. A probable example of this was procured on the 9th of June, 1936, when a female containing eight small embryos was shot.

The young commence breeding when a year old although they do not have as large litters as the fully mature females do.

YOUNG

The time at which the breeding season commences is governed somewhat be the conditions of the weather during April and early May. A dry hot spring will advance the time of mating by a few days and a cold damp one will retard sexual advancement for even a week or more.

My earliest record was secured on the 23rd of May when a female was shot which had given birth to eight young some two or three days before. However, during an average spring the majority of the young are born during the last week of May and the first week of June. At birth the young are naked, blind, toothless and extremely helpless. Their growth, however, is very rapid and they are soon able to move about in their nest which may be anywhere from six inches to six feet below the surface. The earliest I have seen young at the entrance of their mother's hole was on the 17th of June. They were then quite small and decidedly uncertain in their movements. It is believed that their mother leaves them soon after she has taught them to eat green food and seeds, and that they in turn leave soon afterwards as a male weighing 25.85 milligrams and a female weighing 30.78 milligrams were caught on the 19th of June. They had wandered some distance from their place of birth and were evidently seeking new homes for themselves.

When the young leave they scatter and wander further and further afield, often stopping for a few days at an old hole or digging a shallow one for temporary use, the entrance of which is carefully closed behind them when retiring. They usually start preparations for winter when little more than two-thirds grown and have their winter nest and store ready early in September when they are still far from full size and have little or no fat upon their bodies. Growth seems to be suspended during hibernation but with an abundance of spring food growth becomes rapid and they reach full size when about fourteen months of age and full weight two or three months later.

FOOD

The striped ground squirrel is largely dependent on the kinds of food which are available at different times of the year and which are to be found in the immediate vicinity of their home for they are omnivorous feeders. Seeds are eaten at all times of the year, and provide the most important part of their food during early spring, autumn and winter. As soon as the tender shoots of grass and herbs spring up, they largely take the place of seeds.

Green food is consumed extensively from the commencement of the breeding season until the young are able to take care of themselves. Soon after green food has become plentiful, insects become more active and rapidly increase in abundance and in importance to the gopher, as they not only provide food, but what I believe is of greater importance, a copious supply of moisture which is very necessary during the hot dry days of summer.

Next in importance to the foods mentioned, are many kinds of fruits and berries, acorns, nuts, bulbs, tubers and insect eggs, especially those of grasshoppers. Bird eggs are eaten and the flesh of small mammals and birds when found freshly killed. I have found toadstools that have been gnawed but think they are on the whole disliked.

I have often seen it stated that small birds and mice are caught and eaten by striped gophers. I have no records of this being so and as our small ground birds have no fear of the squirrel, which in turn shows great respect for them, I feel sure that the amount of food procured from this source, if any, is extremely small.

The three squirrels caught at Geyser were living in a thicket of Canada thistles, *Cirsium arvensis* and had cut a large percentage of the top spikelets from the plants, taken them to nearby logs and then torn the heads apart to get at the seeds which were evidently being eaten and stored away.

STORING FOOD

The amount of time spent in gathering food for winter and emergency purposes is very great, and unless grain is available keeps the squirrels busy until it is time for them to retire for the winter. What the actual amount of grain or seeds stored in nests and hidden away in odd places is I am unable to say, but the winter nest seldom contains as much as two and a half pounds of wheat and when seeds of native grasses, etc., only are available, seldom as much as one pound, and often only a few ounces. However, there are usually one or two, what I call, emergency nests which contain a considerable amount of food in them. Besides these there is a large amount hidden away in clumps of grass and other odd places. During wet falls grain hidden in such exposed places sprouts and later can be seen as clumps of bright green growing among the ripened prairie grasses. Between a winter hole and a wheat field 140 yards away I have found as many as 173 of these clumps which had grown from between a few dozen grains up to nearly 400 which would be a full load for their capacious cheek pouches, as the greatest amount of wheat that I have taken from the pouches of any one striped gopher is 362 grains.

It is not known how far these squirrels go for food. I have found wheat in nests nearly 700 yards away from the nearest field, and have found cherry stones hidden away nearly half a mile from the nearest cherry trees. These, however, may have been gathered from the dung of coyotes or some other animal which feeds upon cherries. While these may be extreme distances for them to go we have found that they repeatedly visit fields 300 and 400 yards away and carry back sufficient grain for their winter requirements.

HOLES

The holes made by *tridecemlineatus* are not nearly as extensive as the burrows or *richardsoni* or as intricate as those of *franklini*. However they dig to a greater depth than I have known either of these species to do. The holes used during the summer are seldom as deep as those made for winter use, although they are often more complicated and instead of having only one entrance often have two or three. The nest chamber may be made at the lower end of the first hole but is more often at the end of a short side tunnel made especially for it at or near the lowest point of the pole. While such a hole as this maybe the squirrel's headquarters, it will often have a dozen or more secondary holes scattered over a wide area, all of which the squirrels have connected by well known runways.

I have dug out and examined many holes both freshly dug and old which had been, or were to be used during the winter. While I have found many minor variations in them, the general plan followed is so similar that they can at once be identified as having been made by this species. The following example describes in some detail the procedure followed by this squirrel in making its winter home. After selecting a suitable site, a fairly straight hole is dug which reaches a depth of about six feet in a length of 17 feet. At the lower end the nest and store chamber are made. When these are completed a second hole is started usually about half way down the first. This is dug sharply upwards and away from the mouth of the first out of which some of the earth may be thrown but most of it is used in blocking the first hole above the point at which the second one was started. The second hole may be brought to the surface almost directly above the point from which it started or as much as fifteen or even twenty feet away, usually among overhanging grass and weeds where it is hard to find.

Only one winter home has been found with a slump hole. The store of *Stipa* and *Calamovalfa* seed was as usual well mixed in with the nest

material directly below the squirrel's bed which was in the upper third of the nest.

To realize the value of these holes we must understand something of the squirrel's enemies, especially the badger, *Taxidea taxus taxus*, an animal that has no difficulty in digging a squirrel out of a straight hole, but the sharp turn makes the badger's task of throwing the earth upwards and round the turn almost impossible, more especially so if the earth happens to be dry. Beyond this the squirrel receives greater protection from its hole being so well hidden and having no pile of earth at its entrance to give its position away.

Besides their own holes a large variety made by other mammals is used, by far the most important of which are those dug by the pocket gopher, *Thomomys*, whose ramification of shallow feed tunnels and the deeper ones of its home proper afford the ground squirrel greater protection than the best of its own holes could ever do.

NESTS

The slightly oval shaped nest is about seven and a half inches from top to bottom and six and a half inches across. It is usually made of grass that has been dead some months. There is no attempt made to select finer material for the lining or to shred it as it is used throughout the whole nest as gathered.

I have often watched these squirrels gathering material for their nests. The teeth, mouth and hands are used to loosen and gather the grass, and the hands almost exclusively for shoving into the mouth. When fully loaded the squirrel is amost covered by the grass which hangs out of its mouth and which so obscures its vision that it has a hard time getting to and down its hole.

The summer and winter nests are made in the same way and of the same material, the only differences being that the winter nest is the larger and the food is mixed in with the grass as the nest is being made. It is usually placed at a greater depth than is the summer one and the squirrel's bed is in the upper third of the nest instead of in its centre. The nest after being used all winter is usually badly soiled by spring and decidedly musty. If the hole is to be used during the summer the old nest is removed and a new one made.

HIBERNATION

I have been unable to learn how much of the six or seven months lived under ground is spent in dormant sleep, but the fact that the squirrels place fairly large stores of food in the nest just below their bed strongly suggests that they wake sufficiently to enable them to take food at short intervals through the winter. While I have not been able to verify this in the field I have done so with some kept in cages under as natural conditions as I could provide. All of these reacted to the urge of food or were found to be sufficiently awake to utter their soft trills at short intervals, except an old female who was very fat and sluggish. She was known to remain dormant during most of December, January and February and during that time took little or no food.

While in its dormant sleep the squirrel is tightly curled up in a sitting position, its head resting between its hind feet and its tail held over its head and back. Respiration and heart beats are extremely slow and so feeble that they can scarcely be detected. The body is quite rigid and feels cold to the touch. These facts I think explain the oft repeated stories of a gopher being found during the winter beneath a straw pile or hay stack frozen stiff and, that after being placed in a warm place to thaw out, gradually came back to life and soon afterwards was running about looking for food or some place in which to hide.

ECONOMIC STATUS

The economic status of the striped ground squirrel lies in the amount of damage done to agricultural crops, small fruits and garden products. In the spring the squirrels' depredations begin with the commencement of seeding when the seeded grain is dug up and either eaten as found or stored away for future use. This continues until the grains are well rooted. Later the tender shoots are fed upon as they break through the ground until the young plants have become well established. Little damage is done now until the new grain is beginning to reach the milk stage at which time the squirrels commence to cut or break the straws down to enable them to get at the heads. This is continued from day to day until the grain is ripe when the activities of the squirrel are greatly increased as at this time they begin gathering their winter stores. While two or three pounds are ample for the squirrel's winter requirements it usually hides away as much again so that with the other losses which have occurred since the grain was sown in the spring the total loss would probably be in the neighborhood of ten pounds per squirrel. This multiplied by the hundreds of thousands which live in the province will give some idea of the losses which occur each year through the depredations of the striped ground squirrel.

CONTROL

Before Man had destroyed most of the mammal predators which depended so largely on ground squirrels for their food during the summer months the squirrels were much more closely confined to those districts in which they had become adapted

to live and even in them they were probably never allowed to become over abundant. But now, with the introduction of many kinds or grain over an ever-increasing acreage and the pasturing of much land that was formerly unsuitable, their conditions of living have been so improved that but for the control which can be had through the use of poison bait, they would soon increase to such numbers that untold damage would be done to crops of all kinds grown within their reach.

Hawks, I am glad to say, are still in sufficient numbers to more or less control the ground squirrels in the wilder parts of their range. For some years now the hawks have been extending their sphere of action to include much of our treeless prairies. This is largely due to the lines of poles put up to carry communication and transmission wires from the top of which the large hawks, especially the rough-legs, red-tail and Swainson's, are able to see all around and should a squirrel wander too far from its hole it is soon picked up. Nearly all our other species of hawks are not averse to taking a squirrel when opportunity offers. Crows also help as they capture many young during their wanderings in search of new homes.

Control, through the use of commercial and home-made poison bait, should be carried on every spring and especially during the breeding season. However, good results can be had during the whole period of the squirrel's activities above ground. At present there is no best bait but many that are equally good if made up properly and put out at the correct time.

Good control can be had through the use of small bore rifles and traps, but it seems that if these are to be used with success, bounty in some shape or form must be given and I am not at all sure that this is advisable. It is much more expensive and never as efficient as poison when used correctly. Shooting is also more expensive and never as efficient as poison. Shooting is not only more expensive, but the hordes of small boys who teem out of the towns to scurry over the country with their .22 rifles, shoot not only ground squirrels but any other small object that may show life, be it mammal or bird.

April, 1938.

OBSERVATIONS ON THE BEHAVIOUR OF THE EUROPEAN HARE WHEN PURSUED BY HOUNDS

By WM. H. BENNETT

THERE IS no better way to study the intelligent or instinctive habits of an animal than to hunt it. During the past years many hours have been passed chasing the European hare (*Lepus europeus*) with beagle hounds in Southern Ontario. In so doing much has been learned about the tactics which the hare used in evading its enemies.

The hunting of hare is a dangerous sport from the standpoint of the hounds, and a strenuous one for those who follow on foot. Unlike the cottontail and snowshoe hare, the European hare prefers the open country. It is a swift running animal with great staying powers. Across the fields it travels, through barnyards and along highways.

Hares often run at top speed over ploughed fields, where the snow has drifted leaving hard, frozen mud ridges. This means hard nose work for the hound and the ever-present danger of leg twisting. In late winter, it is common practice of the farmer to scatter fertilizer over certain fields. This is often a life saver for the tiring hare, and he readily takes advantage of it to lose the hounds.

Hares frequently run along ruts on country roads or along main highways. They will even run the steel rails on a railroad where scenting, of course, is absolutely nil; or will run the ties between the rails where scenting is not so bad. As a last resort, a hare will not uncommonly run the ties towards an approaching train to jump clear just in the nick of time. One has to sprint to save the hounds at such an occasion.

Thin ice is another favorite place for the hare to slow up beagles. They frequently travel over ice just thin enough to hold themselves, but too thin to hold the hounds.

A hunt usually starts with a short sight run. To entertain the hounds, the wise old hare will usually run a few small circles in the center of a field, then, apparently tiring of the play, will settle down to more serious business. With a straight-away course, it usually runs several fields in a few seconds flat. The hounds lose sight of the hare at the first fence row, and from then on most of the running is done by scent.

Back tracking is one of the oldest and most commonly practiced tricks of the hare. It will stop, run back over its own trail for fifty yards or so, then jump from the line and away in a different direction. Once a hare gets a good lead, it may back track repeatedly in a very short distance. Experienced hounds, of course, will soon unravel this puzzle. When they come to a stop, they will commence to circle in an ever-increasing circumference until the new line is picked up.

During the chase, the hare is seldom more than several fields ahead. It often waltzes on its hind toes or "spy-hops" to study the progress of the hunt. Sizing things up, it apparently decides that things are developing too well and that matters must be complicated somewhat.

The next step usually taken is another simple trick. The hare runs through a rail or stump fence, travels about a hundred yards into a field, and then back tracks to the fence. It goes through the fence again and after loping a few yards over its own trail, suddenly jumps at least 6 feet to the side and proceeds at top speed from the scene.

The pursuing hounds, when they arrive at the dead end in the field, instinctively circle at a check such as this. But considerable time is often spent before a hound will cross the fence to pick up the trail where the hare left off.

Several times have I watched a hare back-track to a stone fence, then run the top of the fence to a great or less distance. Such a trick often ended in a complete loss.

An interesting experience which happened one winter in the Caledon Hills of Ontario was the loss of a hare in a cedar swamp. After about an hour's run over hilly country, the hare had entered the swamp and had immediately proceeded to make a large oval of about a mile in circumference.

The hounds carried the line about six times around and finally came to a loss. Tracks in the snow told the story. What had happened was quite simple. The hare had completed the oval three times and was part way around for the fourth lap when, with a bound, it had left the oval and waved farewell for parts unknown. The hounds had continued to run the oval until all scent had been lost.

Time and again, when a hare had been run for three hours or so and was beginning to tire, another hare would come in from the side and follow it. Invariably, after a short time, it would become aware of its plight and leave the trail of its weary neighbour. What would the hounds do? They almost always followed the newcomer, and the tired hare excaped.

Some days we would travel fifteen or twenty miles in a nearly straight line because a hare, running in a big circle, would pass on its trail to another hare at the extreme of its territory; and the same thing would happen repeatedly, one hare after another.

NOTES ON THE RANGE OF THE LABRADOR SHREW, Sorex cinereus miscix

By C. F. JACKSON

SOREX CINEREUS was first described by Kerr in 1792 as *Sorex arcticus cinereus* In Merriam's revision, (*North American Fauna*, No. 10, 1895, pp. 5-122), the species is noted as extending through "the boreal and transition zones of North America from New England to Alaska". In Jackson's review of the long-tailed shrews, (*North American Fauna*, No. 51, 1928, pp. 1-238), five sub-species of *Sorex cinereus* are recognized. On the map shown on page 39, the eastern range in Labrador of *Sorex cinereus cinereus* extends to a line drawn from Godbout near the north of the St. Lawrence River to Fort Chimo on Ungava Bay. Seven specimens from the latter place, and fifty-eight from Godbout were examined by Jackson.

Dr. R. M. Anderson, in *The Mammals of the Eastern Arctic and Hudson Bay*, (Bulletin Canadian Department of the Interior, 1934, pp. 67-137), notes *Sorex cinereus cinereus* for this region, and Dr. Eidmann (*Zur Kenntnis der Saügetierfauna von Sudlabrador, Zeitschrift fur Saügetierkunde*, 1935, pp. 39-61), assigned certain specimens taken in the Moisie region to the same sub-species.

To the eastward along the Atlantic seaboard is the sub-species, *Sorex cinereus miscix*. Several hundred miles of territory intervene between the two sub-species.

In the summer of 1937, a collecting trip was taken to the region just east of Seven Islands and the Moisie River, the trip extending eastward to the Pigou River. This region lies on the western

edge of the unmapped territory and in proximity to the region occupied by *Sorex cinereus cinereus*. Twenty-six specimens of *Sorex* were taken. Below are the measurements of six typical adults in comparison with measurements given by Jackson (1928) in his review for *Sorex cinereus cinereus* and *Sorex cinereus miscix*. The latter measurements were obtained from the type specimen in the Bangs collection which was taken from the Atlantic seaboard.

			♀	♀	♀	♂	?	♀	♂
	(*a*)	(*b*)	325	241	361	304	298	309	228
Total length	98	104	104	101.5	100	102	100	104	100
Tail vertebrae	40	44	44	43	47	43	44	45	41
Hind foot	11	14	14	12	12	13	12	12	12
Cranial breadth	7.6	8.1	8.5	8.2	8.1	8	8.2	8.5	8.2
Condylobasal length	15.6	16.9	17.4	16.4	16.9	16.7	16.9	16.5	16.4
Interorbital breadth	3.1	3.2	3.	3.	3.1	3.	3.1	3.1	3.
Palatal length	5.9	6.6	6.6	6.6	6.6	6.4	6.7	6.4	6.6
Maxillary breadth	4.1	4.	4.2	4.1	4.1	4.4	4.2	4.2	4.2
Maxillary tooth row	5.5	6.	6.6	6.1	6.6	6.5	6.4	6.1	6.2

(*a*) Adult male, *Sorex cinereus cinereus* from Drury Run, Clinton County, Pa.
(*b*) Type specimen, adult male, from Black Bay, Labrador.

Through the kindness of Dr. G. M. Allen of the Museum of Comparative Zoology, it was possible to compare the above specimens with those of *Sorex cinereus miscix* from the Atlantic seaboard and also with *Sorex cinereus cinereus* from Godbout. Although color is a very doubtful guide in the identification of any of the genus *Sorex*, especially when in summer pelage, the pattern matches perfectly with specimens of *miscix*.

On this basis and a comparison of the above measurements with those given by Jackson, there would seem to be no question but that *Sorex cinereus miscix* extends at least as far westward as the Moisie River and the Bay of Seven Islands. This increases the known distribution of *Sorex cinereus miscix* by several hundred miles and indicates that the entire eastern half of Labrador is probably populated by this sub-species.

Department of Zoology, University of New Hampshire, Durham, New Hampshire.

SIXTIETH ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB

REPORT OF COUNCIL

Meetings.—Transaction of the Council's business during the year required three meetings with an average attendance of 14. These meetings were held at the following homes: January 7th, 1938; Mr. and Mrs. P. A. Taverner; March 8th, Mr. and Mrs. C. M. Sternberg; November 22nd, Mr. and Mrs. P. A. Taverner.

Lectures.—The Annual Meeting of the Club, on December 9th, 1937, was addressed by Mr. A. E. Porsild, of the National Herbarium of Canada, who gave a most interesting illustrated talk on "A Summer Trip to Labrador and Greenland".

Under the distinguished patronage of His Excellency the Governor-General, a lecture entitled "Bird Marvels in Picture and Sound," illustrated by a series of sound motion pictures of rare and remarkable birds in their native haunts, was given by Dr. Arthur A. Allen, Professor of Ornithology at Cornell University, in the auditorium of Glebe Collegiate Institute, Ottawa, under the auspices of the Club, on January 31, 1938. An audience of about 1200 persons greatly enjoyed hearing this very fine address.

The Lecture Committee also co-operated with the Excursions Committee in connection with the series of local lectures presented under the Club's auspices during the winter of 1937-38.

Bird Census.—The local bird census was taken on December 26, 1937, with 20 persons taking part. There were 22 species and over 2600 individual birds reported. The report was sent to Bird-Lore immediately for publication.

Excursions.—Two Committee meetings were held during the year, February 16, at the home

of Miss Whitehurst, and the second at the home of Mr. and Mrs Lanceley, on September 21. At each of these meetings a representative of the excursion ticket holders was present

At the first meeting the Committee decided to undertake the arrangements for a field-day to the Mer Bleue in connection with the Ottawa meeting of the American Association for the Advancement of Science, and Mr. LaRocque was appointed to keep in touch with Dr. Gibson and to act as the representative of the Club.

Lectures 1938.—Lectures were held in St. Patrick's College as outlined below, the average attendance being about 25.

January 13—"Ottawa's Christmas Birds", by Dr. H. F. Lewis.

February 24—"Camouflage in the Living World", by Mr. D. Leechman.

March 24—"Photographing the Birds", by Dr. R. E. DeLury.

April 14—"What will I see this Summer", a series of short talks on birds, botany and mushrooms, by Mr. Lloyd, Mr. Groh and Dr. Groves.

November 17—"How to Know the Trees", by Mr. J. M. Robinson.

Excursions 1938—

January 29—Visit to the Dominion Observatory under the guidance of Dr. DeLury.

April 2—Hog's Back.

April 23—Taylor's Hill.

May 7—McKay Lake.

May 14—Britannia.

May 21—Fairy Lake.

June 4—Mer Bleue.

June 18—Boat trip to Black Rapids.

September 17—Boat trip to Black Rapids.

October 1—Kingsmere.

October 22—Hog's Back.

Oct. 29—Pointe Gatineau.

The Committee's financial report shows a balance of $13.46, turned over to the Club Treasurer. This comprises receipts from excursion tickets amounting to $14.00, advance of $10.00 from the Treasurer, and profits on four trips involving transportation charges, $3.75; and expenditures on postage, stationery and circular postcards $14.29. There are at present 15 holders of excursion tickets, 9 of whom are new this year.

International Committee for the Protection of Birds.—Mr. Hoyes Lloyd and Dr. H. F. Lewis were the representatives.

Publications.—The Publications Committee reports a successful year's activities. The stock of back numbers since 1879 was checked and arranged; a most labourious task and one in which several members of Council assisted. A new cover design received attention, but was not finally adopted. Illustrations were provided even to the point of exceeding our means. New methods of acquainting libraries with our publication are being undertaken. The Committee desires to thank the members of the Club for the support they have given to our publication and to urge all who are interested in Canadian natural history to continue and extend their efforts in this respect.

Finance.—Contrary to the usual situation, the Club will finish the year with a deficit. Economy has been practiced to avoid this, except that more illustrations, as advised by Council, have been used and paid for by the Club. The profits from the Dr. Allen lecture were small, since the admission was by voluntary contribution and expenses were heavy. A small increase in membership would permit the Club to finish its Diamond Jubilee year with a substantial balance.

American Association for the Advancement of Science.—Their Summer Meeting was held in Ottawa this year, having been invited here by the Ottawa Field-Naturalists' Club. Our Club sponsored an excursion to the Mer Bleue, to which delegates of the Association were invited.

Membership.—No activities to report.

Acknowledgements.—The Council wishes at this opportunity to express its appreciation of the work and co-operation of many of its members, and especially to Rev. Father Banim and the authorities of St. Patrick's College for the kind accommodation for the winter lectures, and the leaders of the various excursions, and the lecturers during the winter meetings. Rev. Father Banim deserves special credit for his initation of a study group in botany. Council regrets deeply the passing of Dr. M. G. McElhinney, who had provided many enjoyable excursions, and had taken much interest in natural history. To the Council of 1939 the hope is expressed that they may receive the co-operation and enthusiasm of every member of the Club, as has the present Council.

P. A. TAVERNER, *President*

C. R. LOUNSBURY, *Secretary*

STATEMENT OF FINANCIAL STANDING
OTTAWA FIELD-NATURALISTS' CLUB, NOVEMBER 30, 1938

ASSETS		LIABILITIES	
Balance in Bank, November 30, 1938	$ 47.59	Reserve Fund	$188.69
Bills receivable	86.10		
	$133.69		
Deficit	55.00		
	$188.69		$188.69

RECEIPTS		EXPENDITURES	
Balance in Bank, December 3, 1937	$ 13.89	Printing and mailing The Canadian Field-Naturalist	$ 900.23
Fees—Current	727.14	Editor's Honorarium	50.00
" —Advance, etc.	57.50	Postage and Stationery	36.93
Separates	74.38	Separates	95.60
Illustrations	46.95	Illustrations	97.45
Single and back numbers	8.70	Bank discount	21.27
Miscellaneous	247.83	Miscellaneous	116.01
Total Receipts	$1176.39	Repaid to Reserve Fund	125.00
Advance from Reserve	313.69	Balance in Bank, December 1, 1938	47.59
	$1490.08		$1490.08

WILMOT LLOYD, Treasurer.

Audited and found correct
December 5, 1938.
HARRISON F. LEWIS,
W. H. LANCELEY,
Auditors.

STATEMENT—PUBLICATION FUND
NOVEMBER 30, 1938

ASSETS		LIABILITIES	
Canadian Government Bonds	$900.00	NIL—	
Balance in Bank, November 30, 1938	166.88		
	$1066.88		$1066.88

RECEIPTS		EXPENDITURES	
Balance in Bank, December 6, 1937	$105.85	Payment of Bond Int. to Current Account	39.50
Contributions to Fund	9.00	Balance in Bank, November 30, 1938	166.88
Bond Interest	39.50		
Bank Interest	2.03		
Life Membership	50.00		
	$206.38		$206.38

WILMOT LLOYD, Treasurer.

Audited and found correct.
December 5, 1938.
HARRISON F. LEWIS,
W. H. LANCELEY,
Auditors.

STATEMENT—RESERVE FUND
NOVEMBER 30, 1938

ASSETS		LIABILITIES
Canadian Government Bonds	$1200.00	NIL—
Cash in Bank, November 30, 1938	119.74	
Balance due from Current Account	188.69	
	$1508.43	

RECEIPTS		EXPENDITURES	
Balance in Bank, December 1, 1937	$ 307.27	Payment of Bond Interest to Current Account	$ 54.00
Bond Interest	54.00	Loan to Current Account	313.69
Bank Interest	1.16	Balance in Bank, November 30, 1938	$119.74
Repaid from Current Account	125.00		
	$487.43		$487.43

EDWARD F. G. WHITE, Chairman,
Reserve Fund Committee.
WILMOT LLOYD, Treasurer.

Audited and found correct
December 5, 1938,
HARRISON F. LEWIS,
W. H. LANCELEY,
Auditors.

NOTES AND OBSERVATIONS

PHILADELPHIA VIREO BREEDING IN MUSKOKA.—An addition to the very few breeding records of *Vireo philadelphicus* in southern Ontario was made on June 30, 1938, when I found a young bird just out of the nest being fed by an adult at the Big East River, four miles north of Huntsville, Muskoka. Almost simultaneously a singing male was discovered at the same location and he was seen and heard each day up to July 7th. On July 1st a singing male was found at Doe Lake, 18 miles further north and a few days later two adult *philadelphicus* were seen together about a half mile from where the young had been found. I have worked in this region intermittently for the past fourteen years and have only one previous summer record of this species, at Doe Lake.—R. J. RUTTER.

AN UNIDENTIFIED BANK SWALLOW ENEMY.—A colony of about 50 nests of *Riparia riparia* in the north bank of the Big East River, Muskoka, was raided on the night of July 3-4, 1938, by some mammal which dug down from the top of the bank directly over the nest chambers. Several excavations had been started and abandoned but at least one was successful as was shown by the feathers of young swallows scattered about the entrance. The sandy soil left no recognizable tracks but the size of the holes suggested an animal no larger than a skunk. A careful examination on subsequent days showed no sign of a second visit by the predator. The writer has not been able to find any published record of bank swallows attacked in this manner and would be most interested to hear if others had made similar obse - vations.—R. J. RUTTER.

NOTE.—Stoner (*Roosevelt Wild Life Annals, Vol. 4, No 2, 1936*) records the skunk as the chief mammalian enemy of the Bank Swallow at Oneida Lake, New York.—Editor.

TWO BIRDS WITH ONE STONE.—Under the species account for the Magnolia Warbler, *The Summer Birds of Lake Nipigon, Trans. Roy. Can. Inst. Vol. XVI, Part 2, 1928, p. 272,* the writer listed in the catalogue of specimens a "Juv. ?, July 24, 1924, Macdiarmid." The "?" referred to the sex, not to the species. In 1924 juvenile warblers were practically unrepresented in our

collection and the writer had little or no knowledge of these plumages. We are much better off to-day.

Recently two eagle-eyed co-workers in the Division of Birds placed this specimen before me with a question as to its identity. It proves to be a young Nashville Warbler, a bird representing a genus distinct from the Magnolia Warbler!

With what would seem to be natural embarrassment, I have delved into the history of this specimen. On the back of its label is my note "Young of 2.24.7.24". Specimen No. 2.24.7.24 is certainly an adult male Magnolia Warbler. Fields notes for the day, July 24, 1924, remark, "Shot a — Magnolia and one young (which the adult was feeding)." In other words an adult male Magnolia Warbler was feeding a young Nashville Warbler and I incautiously used the feeding evidence as proof of the identity of the young bird.

I have recorded here a fragment of information on behaviour and have corrected an error—two birds with one stone.—L. L. SNYDER, *Royal Ontario Museum of Zoology.*

BIRD NOTES FROM RED DEER, ALBERTA.—VIOLET GREEN SWALLOW.—The Violet Green Swallow, a very pretty and very friendly member of the swallow group has taken up its abode in this part of the country. Up to two years ago I had never seen one nor had reports of any in this part of the province. At that time a pair of odd looking swallows took up residence in a box placed on top of a ten foot pole at the farm of R. Dixon, Penhold. When I went down to investigate I found them very small, clearly marked and undoubtedly Violet-greens, easily distinguished from the Tree and Barn Swallows so plentiful in that locality near Wavy lake. Their nest was probably not a success that year.

Last year all the farm buildings, including the swallow house, were moved over a hill about two miles to the north and away from the lake. But this year two pairs of these little swallows located and used their old house in its new position where they succeeded in bringing up families, one pair using the north and the other the south entrance.

The presence of people at the foot of the pole seemed to disturb them not at all, they came and went freely or rested on the box thus making identification a simple matter. We hope the colony will increase this coming year.

PURPLE MARTIN.—Purple Martins, so common in some parts of the province have been nesting in the vicinity of Red Deer. Last year a pair looked at houses but went away. This year a few pairs were tempted by unusually fine residences to remain for the summer. They could be seen and heard frequently at quite a distance from the home grounds.

WHISKEY JACK.—Last winter for the first time in many years Whiskey Jacks were plentiful in the woods surrounding the town. It may be that destruction of the big woods nearer the mountains has cut off their winter food supplies. They made themselves quite at home, locating feeding stations which they used as freely as the Blue Jays and departed in spring for their nesting haunts.

BLUE JAYS.—Incidentally the Blue Jays, formerly quite uncommon here, have become quite plentiful in wooded regions and about towns. They are apt to starve in winter however unless given relief rations because we have practically no nuts and few fruits to dry on bushes for winter. They like scraps of all kinds, sun-flower seeds, nuts and corn, so well that I think they would become as tame as the Chickadees if it were not necessary to chase them sometimes because the amount of food carried away and hidden by them leaves other pensioners short. For two years now they have nested in a spruce by the front gate, building a robin size nest of sticks twelve or sixteen feet from the ground. Last year there were four, this year, six nestlings out by the 25th of June. They seemed to interfere little with other birds' nests. All broods of robins in the yard came out safely but there were many fights in which the jays, attacked by a mob of robins, left blue feathers in the yard before being driven into the spruces.

CHESTNUT-SIDED WARBLER.—A small flock of these spent a morning in the spruces on a dull day the last week in August. The yellowish wingbar was bright and clear, beautifully shaped when a bird stretched his wings. The chestnut sides were also clear and the side of the head dark. The flock was migrating. Through the window I could see them at a distance of about ten feet. Marks could be clearly seen. No other bird in Taverner's *Birds of Western Canada* fitted the description.—MINA P. COLE.

REVIEWS

LOGBOOK OF MINNESOTA BIRD LIFE, 1917-1937 *by Thomas S. Roberts, M. D. University of Minnesota Press, $3.50, Minneapolis, 1938.*

For twenty years Dr Roberts has been regularly reporting on the seasonal variations of the bird life of his state. In bi-monthly instalments he has recorded the varying or fluctuating aspects of the changing seasons, the birds and allied phenomena. Here they are all gathered together from their original publication in *Bird-Lore* with some additions and expansions. It makes a most useful history and seasonal comparison that will be invaluable to Minnesota ornithologists and to those of broader ecological interests. Though recording masses of rather disconnected events it is written in an agreeable and readable style, is much more than a bare schedule of dry data, and is interesting reading for its own sake. It is nicely bound in two shades of buckram, the paper is of pleasing soft cream against which the sharp type stands out clearly. Numerous pen and ink drawings adorn the chapter heads and there is a beautiful frontispiece of a Duck Hawk well reproduced from an etching by W. J. Breckenridge and a map showing the faunal areas of the state. Author, artist and printer are all to be congratulated on their work.—P. A. T.

CANOE COUNTRY *by Florence Page Jacques. Illustrated by Francis Lee Jacques, The University of Minnesota Press, Minneapolis, 1938 $2.50.*

This is an intimate narrative of a late summer canoe journey to the Quetico Reserve, western Ontario, and the adjoining Superior National Forest in Minnesota, as recorded by Mrs. Jacques who is here revealed as a sensitive poet-naturalist who lives every minute of her first canoe trip. The book is illustrated freely with drawings by her husband, the well-known nature artist. Between the two of them they have managed to transport an old friend of theirs back through the years to remember details of numerous canoe trips in a different but similar part of the vast northern Ontario wilderness. In fact they give the feeling of their trip so well that the reader journeys with them and sees the charm of living near to nature, feels the joy of wind, of sunsets, of wild flowers; and even smells the jackpines on a hot summer day. Thank you, Mr. and Mrs. Jacques, I enjoyed travelling with you.—H.L.

THE BIRDS OF ALGONQUIN PROVINCIAL PARK, ONTARIO, *by D. A. MacLulich, Contributions of the Royal Ontario Museum of Zoology No. 13, Toronto, 1938, pp. 1-47.*

This is a valuable contribution to Ontario ornithology by the Royal Ontario Museum of Zoology that is so rapidly coming to the fore as an important institution of research in Canada. Many ornithologists, amateur and professional, have visited this park and have recorded their experiences in various scattered printed and manuscript notes. This brochure brings all available information together in a well-digested whole. Great care and discrimination has been exercised in its compilation and it should be of exceeding value to all naturalistically inclined visitors to the park, besides adding another exact detail to the provincial picture.—P.A.T.

A FAUNAL INVESTIGATION OF WESTERN RAINY RIVER DISTRICT, ONTARIO. *by L. L. Snyder; Contributions of the Royal Ontario Museum of Zoology, No. 14, Reprinted from Trans. Roy. Can. Inst. XXII, Part 1, 1938, pp. 157-213.*

The southern peninsula of Ontario has long been subjected to intensive faunal study but the great area to the north and west until recently has been a biotic *terra incognita.* Darkness on the subject however is being rapidly cleared away by the systematic investigations of this, one of our youngest museums, along a line north of the Great Lakes. Numbers already published in this series are on Lakes Nipigon and Abitibi and others are understood to be in various stages of preparation. This report covers the birds and mammals of the extreme southwestern corner of the province and is of particular value in relation to adjoining localities and in fitting this end of the province into the general continental scheme.—P.A T.

THE NORTHWEST COAST SHARP-SHINNED HAWK. *by L. L. Snyder, Occasional Papers No. 4, of the Royal Ontario Museum of Zoology, Toronto, July 14, 1938*

After a critical examination of some 283 specimens, 75 of which were of summer, presumably breeding, dates, Mr. Snyder has made a careful study of the species. Following Peters he discards the current specific name *velox* (Wilson) as

conspecific with and predated by *striatus* Vieillot. Ridgway's proposed subspecies *rufitatus*, he regards as a synonym of *pacificus* (Lesson), type locality Mexico and therefore of far southern distribution. A new northwest coast form, Alaska to Vancouver Island, he therefore names *Accipiter striatus percbscurus, Subsp. nov.* "Like *A. s. velox* in size but darker; the race most markedly differentiated in the juvenile plumage Type locality,—Masset, Queen Charlotte Islands.—P.A.T.

A PREDATOR RELATIONSHIP BETWEEN THE SHORT-EARED OWL AND THE MEADOW MOUSE. *by L L. Snyder and C. E. Hope, Wils. Bull. L, 1938, 110-112.*

A study of above populations at Toronto during the winters of 1936 and 1937 in which an abnormal abundance of mice was accompanied by unusual numbers of Short-eared Owls that preyed upon them. The results are based upon pellet examination of material found under an owl roost in an evergreen grove. The percentage of small rodent remains found in 1330 pellets was 99.1% and 99% for the respective years, involving 2033 individual Meadow, Deer and House Mice. In view of the fact that this probably was but a fraction of the total number of these pests consumed by the birds the value of the study and demonstration is too obvious to need enlargement.—P.A T.

PROPAGATION OF PLANTS *by Kains and McQuesten. Orange Judd Publishing Co., Inc., New York, 1938, $3.50.*

For twenty-two years the original edition, now out of date and out of print, has been the standard text on this subject. To meet the demand for a new edition including all the many recent advances and discoveries, the authors, after two years' effort, prepared the present encylopedic volume of 555 pages with 600 pictures made into 350 plates.

While it is the kind of book that every naturalist who grows any plants, and every amateur gardener will want to have near him it gives abundant advanced information to the professional plant grower, experimenter, teacher and student.

Chapter headings, including ones on germination, seed testing, vegetative propagation, layerage, cuttings, potting, transplanting, grafting, fruit tree stocks, budding, nursery management, pest control, quarantine and planting orchards, indicate the scope of the work.

The teacher will be interested in fifty "practicums" for his classes. A list of the material required for these, as well as a complete outline of each is furnished.

There is an index to plant lists which give particulars for growing each species, and also one general index to subject matter, figures and tables. —H.L.

Affiliated Societies

NATURAL HISTORY SOCIETY OF MANITOBA

1937-38

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	Secretary: R. Haddow.	

Meetings are held each Monday evening, except on holidays from October to April, in the physics theatre of the University Winnipeg. Field excursions are held each Saturday afternoon during May, June and September, and on public holiday during July and August.

McILWRAITH ORNITHOLOGICAL CLUB, LONDON, ONT.

President: J. H. Cameron, 355 Dufferon Ave., London, Ont.; *Vice-President:* Mr. E. D. Brand, 148 William Street, London Ont.; *Recording Secretary:* Miss Frances Jacobs, 353 Princess Ave., London, Ont.; *Migration Secretary:* Mr. E. M. S. Dale, 297 Hyman St., London, Ont.; *Corresponding Secretary and Treasurer:* Keith Reynolds, 32 St. Andrews St., London, Ont.; *Members qualified to answer questions:* W. E. Saunders, 240 Central Avenue, London, Ont.; C. G. Watson, 201 Ridout Street South, London, Ont.; J. F. Calvert, 461 Tecumseh Avenue, London, Ont.; E. M. S. Dale, 297 Hyman Street, London, Ont.

Meetings held the second Monday of the Month, except during the summer.

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VOL. LIII OTTAWA, CANADA FEBRUARY, 1939 No. 2

OBSERVATIONS ON BREEDING AND DEVELOPMENT OF MARTEN, *Martes a. americana* (KERR)

By J. A. BRASSARD AND RICHARD BERNARD

Introduction

THE PURPOSE of this paper is to present additional data on the reproductive behaviour and development of the Pine Marten. Much work has already been done in America by Ashbrook (1927, 1930) and in Europe by Prell (1928), Reinhardt (1929) and Murr (1929).

Martens have been kept in captivity in the Quebec Zoological Garden since 1931. The first births occurred in 1933 from a pair kept in the same pen for two years. The following table gives the date of birth and the number of young as observed for the past seven years.

Table 1.

Date of Birth.	*Number of young*
April 14, 1933	3
April 17, 1935	1
April 2, 1937	2
March 28, 1938	3
April 4, 1938	2

This gives a total of eleven young born in captivity. To date, ten of these are living. The female giving two young on April 2, 1937, produced three young on March 28, 1938, suggesting that the Marten can, and does breed every year.

Mating and Gestation.

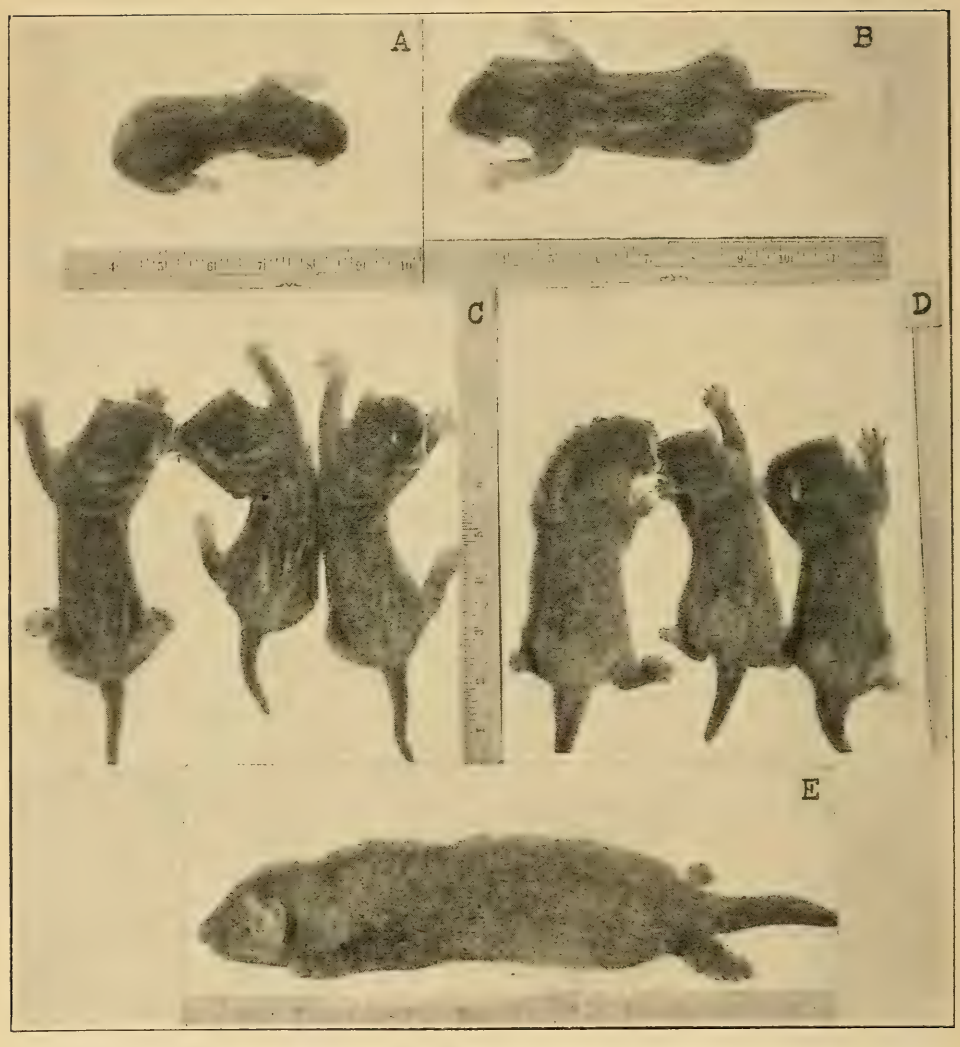
In courtship, the female lies on her back. The male may pass rapidly and frequently over the female with his feet on both sides of her. Very often both are seen lying on their sides and biting one another. This courtship may last as long as fifteen days. During copulation, the male holds the female by the neck with his teeth and just behind the ears leaving no chance for her to bite him. The front feet of the male are placed just behind the thoracic wall of the female.

The mating of the female which produced young on April 4, 1938, was well observed by our keeper on August 20, 1937. Mating lasted at least ten minutes. Three matings of this same pair were observed within a period of six days. These matings were the first observed in our Zoo. Male and female had been left together from May 1937 to the last days of December 1937. In order to obtain additional proof of the time of mating of marten, another pair was left together from August 1 to August 25, 1937. The female gave birth to three young on March 28, 1938 thus confirming the earlier observations of Ashbrook (1930) as to the time of mating. It follows from our observations that the marten have a gestation period of 220 to 230 days as compared with 259 to 275 days given by Ashbrook (1930).

Growth

The growth curves of four young martens born in the spring of 1938 are given in Figs. 1-4. The weights were taken regularly at intervals of about one week and sometimes oftener. At birth, the young weighs about 28 grams. Following the curves, a sharp decline in weight of some 20 to 30 grams is noticed at the age of six weeks, which is the time of weaning. As soon as the young learn to eat properly, growth is resumed after 5 to 10 days. Meat was seen in the nest between the fifth and sixth week. The mother still had two milk glands slightly inflated when the young were sixty days old. During the first days of lactation only four glands appeared as functional. A second drop in weight was noticed at 90 days when the young were separated from the mother. The average weight of an adult female varies from 750 to 800 grams while that of an adult male is 1100 to 1200 grams. The adult weight is attained at about three months at which time the permanent dentition has appeared.

Sexual disparity is slightly noticeable in two-week-old martens, but very obvious at three



weeks. The female is not as large and heavy as the male. At three weeks, the males were easily recognized by the small ridge (raphe) which runs from the anus to the penis. We have observed that at sixteen weeks old (July 15), the male and female showed marked sexual interest. It is doubtful however if marten born in the spring can be induced to mate in August of the same year.

The data gathered concerning the weighing and the measurements are recorded in tables 2 and 3. The increasing activity of the young at seven weeks made accurate measurements impossible. Accordingly no further data are available on the measurable growth rate following this age.

The ears are naked and closed at birth. At eighteen days, a few hairs are seen between the folds of the ears. At 24 days hairs cover the whole ear which is opening slowly, and at 26 days, the young martens exhibit a reflex movement to the noise of the camera shutter. When they are 39 days old, the eyes have just opened At this age, the young can raise their bodies about half an inch from the ground and crawl backward only. At 46 days, they crawl forward and raise their bodies an inch from the ground and begin to climb out of their nest.

TABLE 2.

WEIGHT INCREASE OF YOUNG MARTENS. (grams)
SPRING AND SUMMER 1938.

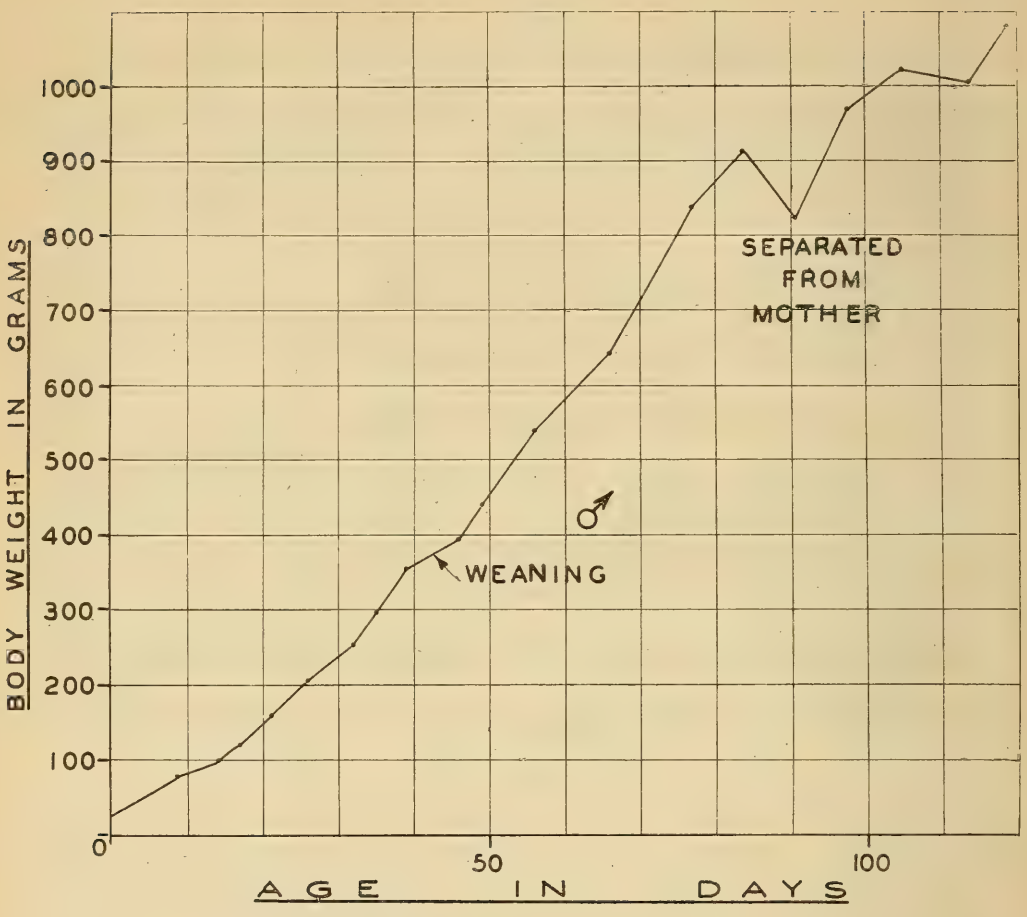
Date of weighing	Litter Born March 28				Litter Born April 4.	
	No. 1 Male	No. 2 Male	No. 3 Female	Age	No. 4 Male	Age
April 4					28	at birth
" 13	133	127	100	18 days	78	9 days
" 16	152	146	118	3 weeks	99	2 weeks
" 19	178	175	140	24 days	124	17 days
" 23	210	206	173	4 weeks	162	3 weeks
" 28	257	250	210	32 days	206	26 days
May 4	318	304	256	39 days	266	32 days
" 7	351	338	274	6 weeks	296	5 weeks
" 11	330	312	268	46 days	355	39 days
" 18	423	403	348	53 days	398	46 days
" 21	483	480	395	8 weeks	443	7 weeks
" 25	560	555	450	60 days	537	8 weeks
June 1	605	655		66 days		59 days
" 8	702	702	560	74 days	647	66 days
" 16	837	840	652	82 days	840	11 weeks
" 25	885	901	689	13 weeks	916	12 weeks
July 2	827	829	614	14 weeks	823	13 weeks
" 8	983	961	741	15 weeks	978	14 weeks
" 15	1093	1023	713	16 weeks	1025	15 weeks
" 23	1050	1043	740	17 weeks	1006	16 weeks
" 29	1135	1157	755	18 weeks	1080	17 weeks
Aug. 9	1097	1212	751	136 days	1247	126 days

TABLE 3.

MEASUREMENTS OF YOUNG MARTENS (in mm.)
SPRING AND SUMMER 1938.

Date of measurements	Litter Born March 28				Litter Born April 4.	
	No. 1 Male	No. 2 Male	No. 3 Female	Age	No. 4 Male	Age
April 13	T.L.218	206	200	18 days	T.L.140	9 days
	T. 50	60	50		T. 40	
	H.F. 35	35	30		H.F. 23	
April 19	256	262	225	24 days	212	17 days
	65	75	60		45	
	40	40	35		30	
April 28	300	312	275	32 days	250	26 days
	87	87	62		56	
	50	55	43		37	
May 4	325	337	300	39 days	287	32 days
	90	105	85		70	
	55	60	50		50	
May 11	350	362	362	46 days	325	39 days
	100	110	100		90	
	65	65	65		60	
May 18	387	400	362	53 days	367	46 days
	110	120	100		100	
	80	70	65		60	

T.L.—Total Length
T.—Tail
H.F.—Hind Foot



GROWTH OF ♂ MARTEN BORN APRIL 4, 1938.

FIG. 1

FUR.

At birth, the young marten is reddish like new born mice and slightly covered with fine yellowish hairs. Eight days after birth, one can notice the appearance of dark gray stripes. The intensity of these markings is not equally well shown in every litter. This spring (1938) only one litter of martens showed strong markings. On the shoulder, the black stripes are crosswise while on the back they run parallel with the body. These markings are most prominent at sixteen days (Fig. C) and disappeared at twenty days (Fig. D). The general colour of the young is dark gray until they are three weeks old. At this time, they become paler and slowly assume their brownish colour. The change begins with the posterior part of the body. The head, tail and limbs are always darker than the rest of the body. The fingers are whitish and remain thus until six weeks old. At twenty days old, the throat and ears are covered with white hairs which ultimately become light yellow.

CHANGES IN THE TEETH DURING POSTNATAL GROWTH.

The adult dentition is: Incisors, 3/3; Canines, 1/1; Premolars, 4/4, Molars, 1/2 = 38.

Incisors.

The upper milk incisors appear at seventeen days and disappear at thirty days. At thirty-nine days, the upper lateral incisors erupt. All the upper incisors have cut the gums at sixty

days. The lower milk incisors appear as buds at fifty-three days. These deciduous teeth disappear at sixty days. At this time, the central incisors are visible. The four lower incisors at the center are one millimeter long when the laterals are only buds. All the lower incisors have erupted at twelve weeks. It is thus apparent that completion of the incisor dentition of the lower jaw follows that of the upper jaw by five weeks

Canines.

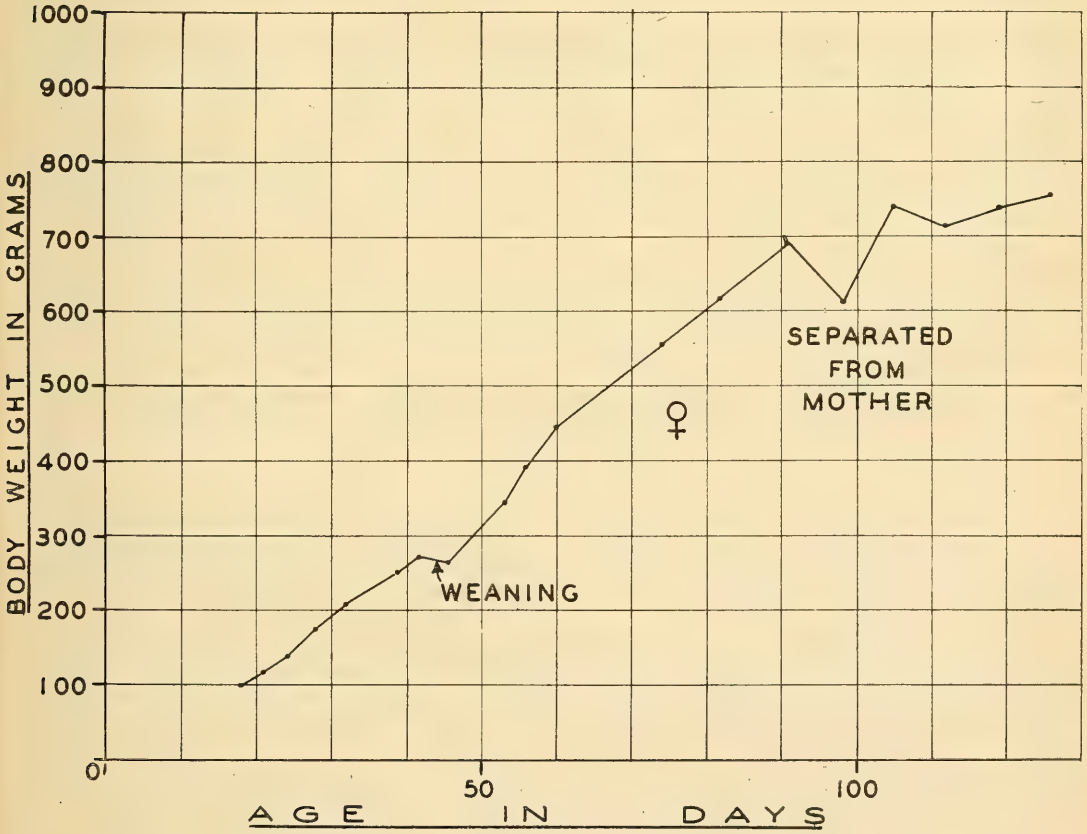
The upper milk canines appear at seventeen days. When the young are fifteen weeks old, the upper permanent canines have a length of two millimeters and push out the milk teeth at seventeen weeks old. The lower canines are budding at thirty-five days and are well erupted at thirty nine days.

Molariform teeth.

At thirty days old, the first milk teeth to show on the upper jaw are the sectorials. These are pushed out by the permanent sectorials at the age of sixteen weeks. In the lower jaw, the first milk premolars appear at thirty-seven days and the last permanent teeth to bud are the third and fourth premolars. This occurs at seventeen weeks.

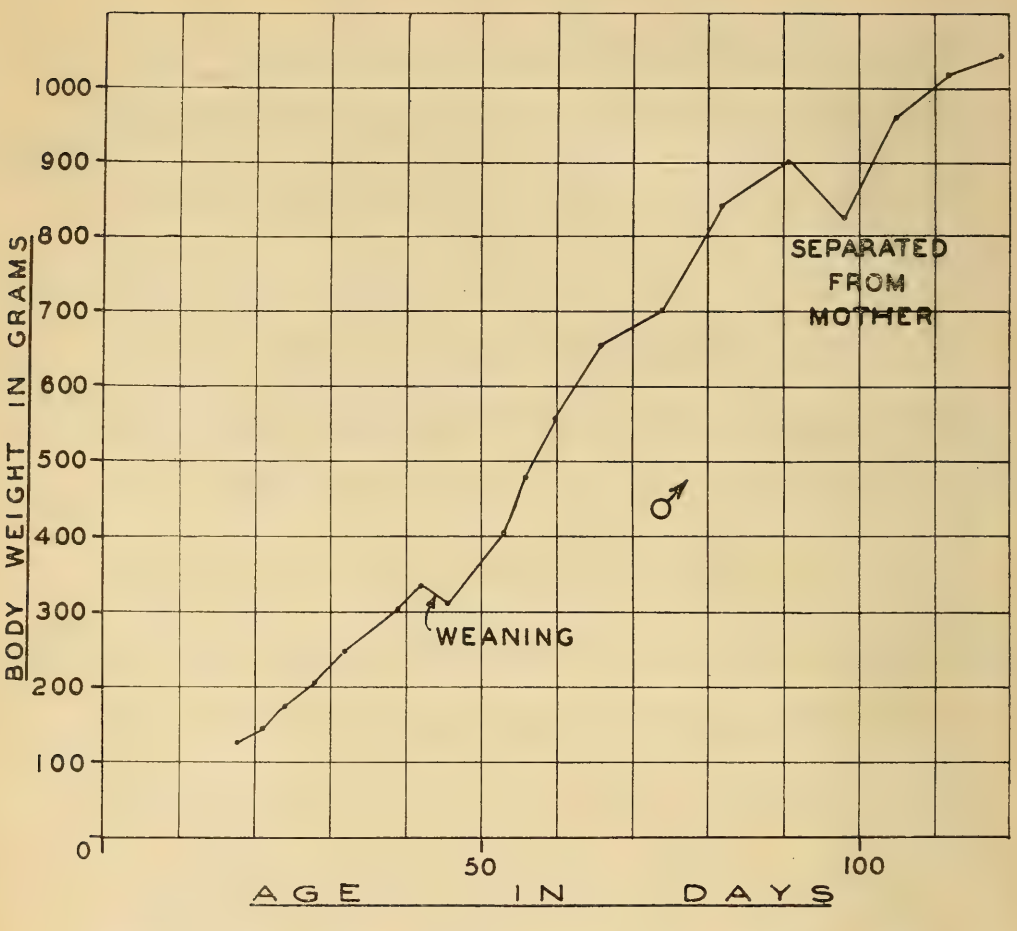
The molars of the upper jaw appear at six weeks. In the lower jaw, the first molar is out at thirty-nine days, while the second molar had just budded at thirteen weeks old.

The martens have their permanent dentition complete on both jaws at the age of eighteen weeks while that of the New York Weasel *Mustela noveboracensis* (Emmons) is complete at seventy-five days (Hamilton 1933).



GROWTH OF ♀ MARTEN BORN MARCH 28, 1938

FIG 2



GROWTH OF ♂ MARTEN Nº 2 BORN MARCH 28, 1938

FIG. 3

The authors wish to thank Dr. W. J. Hamilton Jr., of Cornell University, for his numerous suggestions.

SUMMARY

Martens have been bred at the Quebec Zoological Garden since 1933 Mating has been observed about the 20th of August. Male and female had been left together during the short period extending from August 1 to August 25. Births have been recorded on April 4, 14, 17 and in one instance on March 28.

The gestation period was found to be from 220 to 230 days. The young are weaned between six and seven weeks. The young attain adult weight at about three months. Adult females weigh about 750 grams while the average weight of males is about 1100 grams. At twenty-six days, the ears are opened, while the eyes are fully opened at thirty-nine days. At ten days, the fur is marked with dark gray stripes which disappeared around twenty-five days. The permanent dentition is complete at eighteen weeks.

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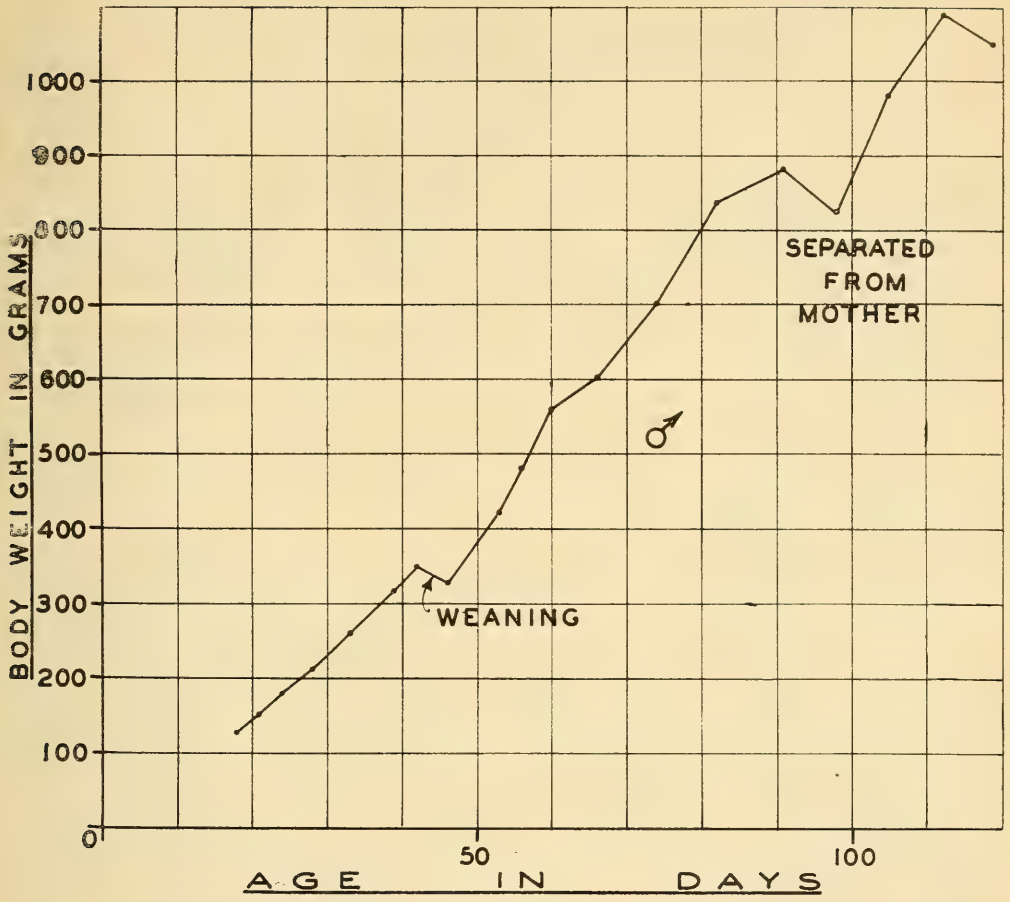

GROWTH OF ♂ MARTEN Nº 1 BORN MARCH 28, 1938

FIG. 4

PRELL, H. Die Fortpflanzungsbiologie des amerikanischen Fichtenmarders Martes americana Turt. *Die Pelztierzucht*, 4 (4), 1928.

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Plate I. YOUNG OF *Martes a. americana* (Kerr).

FIG. A. *Nine days old. Male born on April 4, 1938. Note faint transverse markings on shoulders and white streak on the back.*

FIG. B. *Fifteen days old. Same male as in Fig. A. The feet are lightly coloured.*

FIG. C. *Sixteen days old. Litter born March 28, 1938. Female in the center. The markings are prominent.*

FIG. D. *Twenty-three days old. Same litter as in Fig. C. The markings have completely disappeared.*

FIG. E. *Thirty-six days old. Male born March 28, 1938. Eyes and ear are opened. The animal is still crawling. Note the dark tail and feet.*

A PLAN OF ONTARIO SUBDIVISIONS AND THEIR NAMES FOR NATURALISTS

By L. L. SNYDER

REFERENCE BOOKS such as *Gray's Manual of Botany* and the *A.O.U. Check-List of North American Birds* attempt to outline the limits of range of plants and birds respectively in a concise but informative manner. They employ the names of political units, provinces and states, the location of which is common knowledge and the result is a readily-interpretable delineation.

Because of the large area of our provinces there would be little exactness in describing a range limit solely with province names. It is, therefore, customary, particularly in works on birds, to add a modifying adjective to the province name such as "southeastern" British Columbia or "southern" Manitoba. This practice improves a range circumscription considerably.

Because of the irregular outline of the Ontario area, it is extremely difficult to divide it into sections oriented by compass terminology. It seems clear to the writer that we cannot employ the names of smaller political divisions or locate boundaries by the use of degrees of latitude or longitude because such are not widely and familiarly known. It is therefore advisable that we set up an arbitrary system of divisions, each as logically located by compass designation as possible.

There is little use in attempting to draw from the literature terminology used by authors on Ontario distribution. Some of the terms found there are obviously relics of the historic past. For example, "western Ontario" is used for the region around the city of London! A glance at the map of our province will convince anyone, at least persons living outside the district concerned, that London is not anywhere near the western portion of the whole area. In popular parlance, anywhere north of Lake Simcoe is "northern Ontario"! Of course, this is a top-heavy view which ignores the sparsely settled hinterland which extends seven or eight hundred miles beyond. The need for some scheme seems evident when one sees in current literature designations which place Iroquois Falls in "northwestern Ontario" and Prince Edward County in "south-central Ontario"!

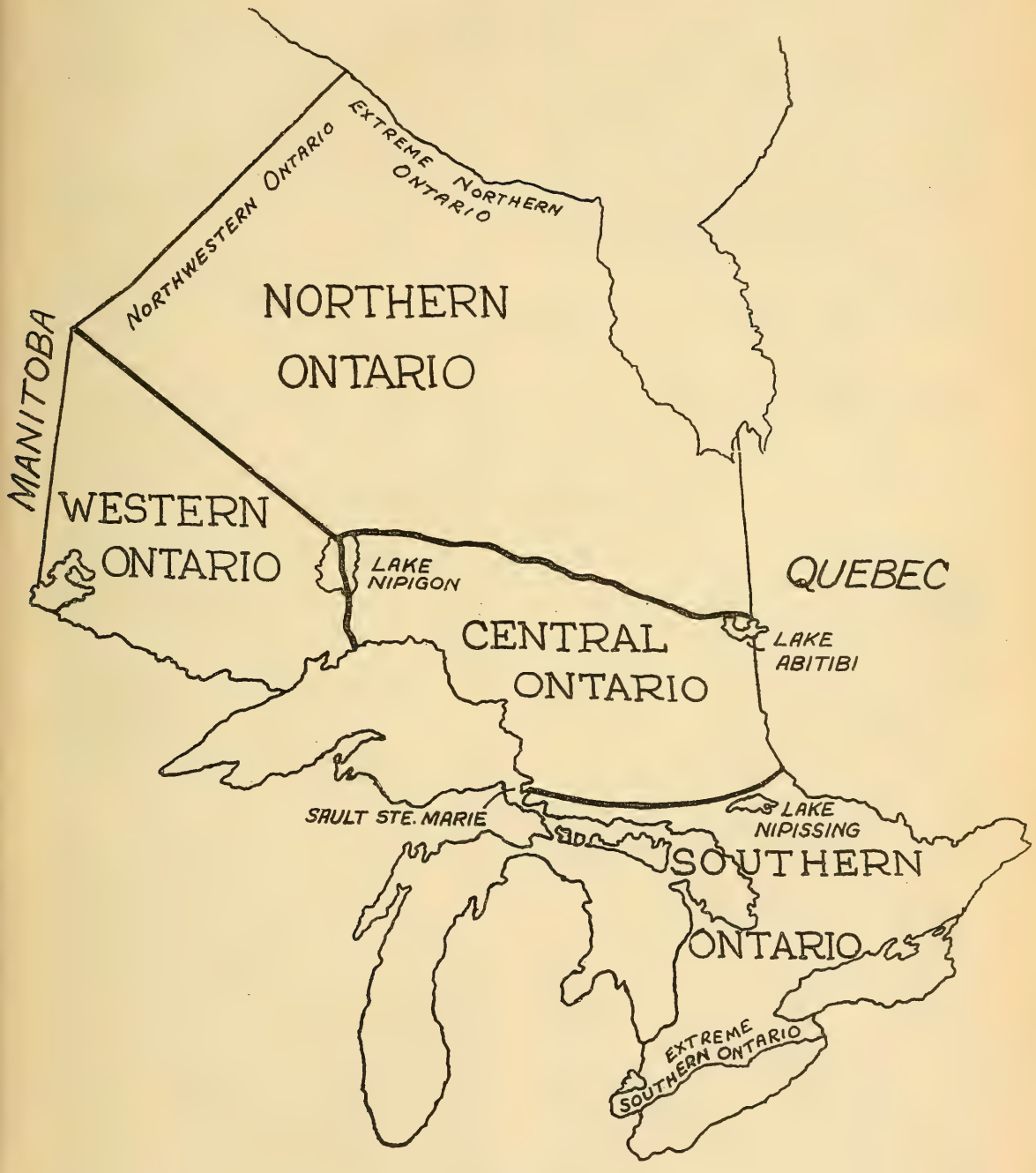
An attempt has been made to secure the ideas of others concerned with animal and plant distribution. There was little agreement in the suggestions of persons resident in the province. It is of interest to note that the interpretation of several ornithologists outside our area showed remarkable uniformity and agreement with the plan here proposed. This plan is not a composite of the views of many individuals; it is a plotting of the terms used at various times by the writer. Orientation is made from an approximate center of the whole provincial area and plotting is more or less based on the assumption that there is neither a southwestern nor a northeastern section of Ontario. If others accept it as logical and convenient, perhaps some uniformity in the matter may develop.

Southern Ontario: The area south of a line drawn from Sault Ste. Marie eastward to Quebec north of the basin of Lake Nipissing. The northern boundary seems a logical one since it is a striking faunal and floral limit and it approximates a well known historic boundary.

Central Ontario: The area from southern Ontario, as described above, north to the Canadian National Transcontinental Railroad and west to Lake Nipigon and the Nipigon River. The use of the C. N. R. line as the northern boundary is arbitrary but it is a definite line which will be found on most maps and its use with the other boundaries mentioned roughly encloses the portion of Ontario central to the whole. The railway line approximates an old beach border of glacial Lake Ojibway; and railway lines have been used in a legal sense as boundaries defining hunting areas. The Lake Nipigon-Nipigon River boundary forms a well-marked physiographical feature and roughly marks the eastern extension of many western faunal and floral elements in this section. Further, the northern "hump" of Lake Superior which reaches its highest latitude on this line, bisects the northern periphery of range of a number of forms.

Western Ontario: The area west of the Lake Nipigon-Nipigon River line and south of a line drawn from Lake Nipigon to the angle of the Ontario-Manitoba boundary. The more or less imaginary northern boundary is arbitrary but it encloses that portion of the province which is most westerly to the whole and includes the range of many western faunal and floral elements

Northern Ontario The area of the province north of the sections previously outlined.


NORTHWESTERN ONTARIO
EXTREME NORTHERN ONTARIO
NORTHERN ONTARIO
MANITOBA
WESTERN ONTARIO
LAKE NIPIGON
QUEBEC
CENTRAL ONTARIO
LAKE ABITIBI
SAULT STE. MARIE
LAKE NIPISSING
SOUTHERN ONTARIO
EXTREME SOUTHERN ONTARIO

The accompanying map indicates the boundaries as presented in the text. Smaller subsections can be designated by using compass definitions within the four main areas; e.g. Lake Abitibi, "Northeast (or N.E.) Central Ontario," or, Muskoka Lakes, "Central-Southern Ontario," etc. It seems advisable that the counties bordering Lake Erie receive some special designation because of the markedly characteristic biota found there. "Extreme Southern Ontario" is suggested on the map. Other phrases can be used which will be self-explanatory, such as the "James Bay portion of Northern Ontario" or, Cornwall is in the "Eastern peninsula of Southern Ontario".

With this plan it will be possible to delineate the northern limit of range of many animals, particularly birds, with a considerable degree of detail. The following is quoted from the 1931 edition of the A.O.U. Check-List, on the northern limits of range of the Baltimore Oriole (*Icterus galbula*),—". . . from central Alberta, central Saskatchewan, southern Manitoba, Ontario, New Brunswick, and Nova Scotia south to . . ." A more accurate description of its range in Ontario can be given by the addition of three words as follows,—" . . . from central Alberta, central Saskatchewan, southern Manitoba, western and southern Ontario, . . . etc."

It seems reasonable that a span of one thousand miles calls for an elaboration of statement by three words.

THE AMERICAN LOCUST (Schistoeerca americana DRURY (Orthoptera)) IN ONTARIO

By F. A. URQUHART
Royal Ontario Museum of Zoology

DURING the past summer a study of the orthoptera fauna of Essex County was made by the Division of Entomology of the Royal Ontario Museum of Zoology. Among the many interesting specimens that were obtained, a few of which were new records for the province of Ontario, the most conspicuous was the occurrence of *Schistocerca americana* Drury.

The first record of this species having been taken in Ontario is that of Moffatt (*Can. Ent.*, 27; 52: 1895) who obtained the specimen from Mr. G. C. Anderson. Moffatt remarks, "This species has been reported as causing considerable damage at times on the south side of Lake Erie, from whence probably it has come to us."

Unfortunately no information as to time and place are recorded in this short account.

The second published record of the capture of this species in Ontario is that of Walker, (*Can. Ent.*, 29: 59. 1897) who received his specimen from C. T. Hills. This specimen, a female, was taken about October 12, 1896, in High Park, Toronto, by Mr. H. Parish.

Mention is again made of this species by Walker in his "Notes on Some Ontario Acrididae" (*Can. Ent.*, 31; 29-36. 1899) who states, "This large and beautiful locust has been twice reported from Ontario, at London and at Toronto, a single example being taken in each instance. These were probably wanderers from the south certainly in the case of the Toronto specimen, and the insect can hardly be regarded as a native of our province, though it may be established in the extreme southern portion."

Concerning the distribution of *Schistocerca americana*, Scudder in his paper entitled "The Orthopteran Genus Schistocerca" (*Proc. Amer. Acad. Arts & Sci.*, 34: 441-476. 1899), writes as follows: "Excepting S. *peregrina*, which has crossed the ocean and colonized another world, S. *americana* is the most widely distributed member of the genus and merits its name, ranging as it does from North America east of the Great Plains and south of about latitude 40 ; through the West Indies, Mexico and Central America to South America, where it occurs as far as Colombia in the west and Argentina in the east, though the records of its occurrence in South America are few. North of north latitude 40 or thereabouts, sporadic cases of its appearance are recorded, notably Massachusetts and southern Ontario; these are doubtless accidental visitants, flying from their proper home farther south."

Up until the present time *Schistocerca americana* has thus been considered an adventitious species in the Province of Ontario but the result of the Museum of Zoology's work in southern Ontario suggests that such is not the case.

On June 18, the first specimen of *Schistocerca americana* was seen on the open beach of the east

shore of Point Pelee, Ontario. An attempt was made to capture the specimen but its strong flight carried it far out over the lake. On June 22, four specimens, none of which was captured, were flushed from a recently ploughed, sandy field on Point Pelee. During the following week from June 22 to June 28, twelve specimens were seen in various parts of Point Pelee but it was impossible to approach within six feet of them before they took to flight. On June 29 the first specimen, a female, was taken in an asparagus field. This specimen, numbed by the coolness of the night, did not readily take flight and its capture was, in that way, made possible. On July 7, Mr. D. Tilden captured a female in a near-by potato field and on July 19 a male was taken from the same locality.

It was believed at that time that this species, although apparently quite common at Point Pelee, was adventitious and no attempt was made to secure the eggs from the captive females. However, on August 6, a nymph, measuring 12 mm. in body length was taken from a small clump of beach grass on the east shore of Point Pelee. The identity of this specimen was not known at the time but a recent study has proved it to be that of *Schistocerca americana*. On August 28, a second nymph, measuring 28 mm. in body length, was found in the same locality. Both of these specimens are light green in colour spotted with brown. On September 14, a third nymph, measuring 36 mm. in body length, was taken in an open field of the same locality. This specimen is light reddish-brown in colour, minutely spotted with dark brown. The dorsal carina of the pronotum has a distinct median, longitudinal dark line. A dark bar extends ventrad of the compound eyes and similar dark lines are present at the base of the undeveloped tegmina.

On September 27, while collecting in an open pasture field at Ruthven, Essex County, Ontario, an adult specimen of *S. americana* was seen flying across the field. A careful search in the long grass at the margin of the field produced two adult specimens, one of which escaped, the other, a female was captured.

As to the life history of this species in Ontario little can be said. Blatchley (*Orthoptera of North Eastern America*) states, "Freshly moulted, mature specimens, *from eggs hatched in spring*, have been taken in Vigo County on June 18, and on three different occasions numerous specimens have been seen as late as November 22"

Moffatt, to whom reference has been made previously, quotes C. V. Riley as stating that, "It has a wide range, *hibernates in the winged condition*, and differs not only in size from the Rocky Mountain locust, but entomologically is as widely separated from it as a sheep from a cow."

From the evidence submitted in this present paper it would appear that the habits of *S. americana* in Ontario confirm the opinion of Riley since adult specimens do occur in numbers in the spring in southwestern Ontario and also in the fall of the year, the immature stages making their appearance from the first week of June until the second week of September.

CHRISTMAS BIRD CENSUSES, 1938

WOLFVILLE, N S.—December 26: 11.00 a.m. to 5.00 p.m. Overcast; wind north, light; 1 in. snow; temp. 28° at start. Two observers together, 64 miles by auto, 4 on foot. Black Duck, 88; White-winged Scoter, 28; American Common Merganser, 8; Nova Scotia Ruffed Grouse, 1; Great Black-backed Gull, 5; Herring Gull, 43; Northern Flicker, 1; Eastern Crow, 143; Brown Creeper, 1; Common Starling, 110; Myrtle Warbler, 1; English Sparrow, 120; Eastern Song Sparrow, 1; Total, 13 species, 550 individuals. This list seems noteworthy in that it contains so few seed-eaters, and also because of the absence therein of Blue Jays and Chickadees, which are abnormally scarce this winter. — R. W. TUFTS and W. EARL GODFREY.

MONTREAL QUE.—(Census area includes Mount Royal Park, Westmount mountain, Côte des Neiges, Outremont, Montreal West, Montreal East, Verdun, Ile au Héron Bird Sanctuary, Longueuil, St. Lambert, Laprairie, and Ste. Dorothée).—December 26, 1938, 8.45 a.m. to 5 p.m. Clear; 5 in. snow; wind light northeast; temp. 10.05° min. 21° max. Observers in groups as follows: party I, 3 observers, 6 hours, 7 miles on foot; party II, 2 observers, 2 hours, 2½ miles on foot, 4½ hours, 42 miles by automobile; party III, 2 observers, 2¾ hours, 4 miles on foot; party IV, 2 observers, 3½ hours, 7 miles by motorboat; party V, 4 observers, 3½ hours, 4 miles on foot; party VI, 4 observers, 4½ hours, 5 miles on foot; party VII, 1 observer, 6¾ hours, 10

miles on foot; party VIII, 1 observer, 2 hours, 3½ miles on foot; party IX, 1 observer, 5 hours, 6 miles on foot. Total miles afoot, 42; total hours afoot, 32½; total miles by boat 7; total hours by boat 3½; total miles by automobile 42; total hours by automobile 4½. Man-hours afield, 40½; total distance travelled, 91 miles, American Golden-eye, 67; American Common Merganser, 3; Red-breasted Merganser, 1; American Rough-legged Hawk, 8; Ruffed Grouse, 1; Great Black-backed Gull, 1; Herring Gull, 10; Great Horned Owl, 2; Snowy Owl, 2; Short-eared Owl, 5; Hairy Woodpecker, 3; Downy Woodpecker 15; Blue Jay, 4; American Crow, 2; Black-capped Chickadee, 88; White-breasted Nuthatch, 25; Brown Creeper, 1; Northern Shrike, 1; Common Starling, 461; House Sparrow, 600; Snow Bunting, 142. Total 21 species, 1442 individuals. One Bronzed Grackle, and six Common Purple Finches were seen in the city on the 25th. — H. A. C. JACKSON, Mr. & Mrs. L. M. TERRILL, J. D. FRY, J. LEMOINE, H. F. SEYMOUR, J. A. DONALD, V. C. WYNNE-EDWARDS, DAN RYAN, JR,. MISS RUTH ABBOTT, MISS PHYLLIS ABBOTT, MR. & MRS. G. H. MONTGOMERY, JR., D. M. SCOTT, A. M. TERROUX, MR. & MRS. F. R. TERROUX, J. D. CLEGHORN, J. B. GOLLOP, W. J. BROWN, (*The Province of Quebec Society for the Protection of Birds, Inc.*)

OTTAWA, ONT.—December 24, 1938; 8.00 a.m. to 5.10 p.m. Completely overcast most of day; 20 min. sunshine, 1.40 to 2 00 p m.; snowing from daybreak to 11.30 a.m. and from 3.15 p.m. until dark; 4 in. snow on ground; light east wind, nearly calm at times; temp. 16° at 8.00 a.m., 23° (maximum) at 2.30 p.m. Twenty-one observers in ten parties, in various directions about Ottawa. American Golden-eye, 123; American Common Merganser, 1; American Goshawk, 1; Ruffed Grouse, 15; Common Pheasant, 4; Rock Dove, 30; American Screech Owl, 1; Barred (?) Owl, 1; Owl (sp. ?), 3; Hairy Woodpecker, 4; Downy Woodpecker, 9; Blue Jay, 9; American Crow, 25; Black-capped Chickadee, 172; White-breasted Nuthatch, 20; Red-breasted Nuthatch, 16; Brown Creeper, 3; Northern Shrike, 3; Common Starling, 615; English Sparrow, 1435; Redpolled Linnet, 64; Pine Siskin, 32; American Goldfinch, 7; White-winged Crossbill, 24; Tree Sparrow, 16; White-throated (?) Sparrow, 1; Song Sparrow, 2; Snow Bunting, 622; Total 27 (possibly) 28 species, 3258 individuals. The numbers of American Golden-eyes, Ruffed Grouse, and English Sparrows recorded above are greater than the numbers of these species recorded in any previous Christmas Bird Census at Ottawa. —OTTAWA FIELD-NATURALISTS' CLUB.

Observers: R. M. Anderson, R. F. Clarke, D. B. De Lury, R. E. DeLury, Willard Dennis, B. A. Fauvel, G. H. Hammond, T. S. Hennessey, C. E. Johnson, Gifford Johnson, Revell Johnson, Mr. and Mrs. W. H. Lanceley, C. R. Lewis, Harrison F. Lewis, Hoyes Lloyd, Doris Maxwell, Arthur D. Nelles, A. E. Porsild, Stanley Sternberg, Thos. Stewart.

ARNPRIOR, ONT.—December 25, 1938; 10. 0 a.m. to 4.30 p.m. Fine, 3 in. snow, moderate w. wind; temp. 10° at start, 17° at return. Sixteen miles on foot. Observers separate. Large Hawk (Goshawk?), 1; Canada Ruffed Grouse, 5; Eastern Horned Owl, 1; Northern Pileated Woodpecker, 1; Eastern Hairy Woodpecker, 7; Northern Downy Woodpecker, 4; Northern Blue Jay, 3; Eastern Crow, 1; Black-capped Chickadee, 22: White-breasted Nuthatch, 5; Red-breasted Nuthatch, 4; Northern Shrike, 2; Common Starling, 66; House Sparrow, 1 plus; Eastern Evening Grosbeak, 9; Common Redpoll, 9; Snow Bunting, 65; Total, 17 species, 206 plus individuals. Subspecies determined geographically. — LIGUORI GORMLEY and CHARLES MACNAMARA.

PAKENHAM, LANARK CO., ONT.—December 26, 1938, 8.45 a m. to 12.15 p.m. and 1.45 p.m. to 4.00 p.m. Clear air, bright sunshine, trees coated with frost; in the afternoon, milder, overcast part of the time, fresh east wind. Visibility and hearing excellent, 3 in. light snow, temp. 2° at start, 17° at noon, 19° at 4.00 p.m. Four observers, two travelling together. All motored 12 miles; two travelled 12 miles on foot and two travelled 3 miles on foot. Canada Ruffed Grouse, 1; Northern Pileated Woodpecker, 1; Eastern Hairy Woodpecker, 3; Northern Downy Woodpecker, 5; Blue Jay, 3; Black-capped Chickadee, 74; White-breasted Nuthatch, 28; Red-breasted Nuthatch, 24; Eastern Brown Creeper, 8; Common Starling, 49; English Sparrow, 55; Eastern Evening Grosbeak, 2; Common Redpoll, 25; (another flock heard). Total, 13 species, 278 individuals. Because of the mild autumn we had expected some stragglers, but our list is composed of typically winter birds. We saw Grouse tracks in many places in the woods.

White-breasted and Red-breasted Nuthatches were generally distributed and more numerous than we have found them on any previous Census Day. Pine Siskins were plentiful during autumn, but have not been seen since about Dec. 12. —ALLAN I. ROSS, VERNA M. ROSS, WILMER ROSS, EDNA G. ROSS.

TORONTO, ONT.—December 26, 1938. 7.45 a.m. to 5.00 p.m. Fair at first, clouding about 10.00 a.m. and rest of day mostly cloudy; wind south-east, 20 to 26 miles; about 2 inches snow; max. temp. 37°, min. 32°. Thirty-five observers in five parties. Redhead, 2; Greater Scaup Duck, 2045; American Golden-eye, 270; Buffle-head, 29; Old-sqaw, 608; Hooded Merganser, 3; American Common Merganser, 93; Red-breasted Merganser, 1; Sharp-shinned Hawk, 1; Red-tailed Hawk, 1; American Rough-legged Hawk, 1; Marsh Hawk, 1; American Sparrow Hawk, 5; Common Pheasant, 104; Common Gallinule, 1; American Coot, 1; Glaucous Gull, 2; Iceland Gull, 1; Great Black-backed Gull, 30; Herring Gull, 3250; Ring-billed Gull, 13; Great Horned Owl, 2; Belted Kingfisher, 2; Hairy Woodpecker, 7; Downy Woodpecker, 37; Blue Jay, 30; American Crow, 9; Black-capped Chickadee, 156; White-breasted Nuthatch, 28; Brown Creeper, 20; Golden-crowned Kinglet, 13; Northern Shrike, 1; Common Starling, 1675; Northern Yellow-throat, 1; English Sparrow, 1965; Eastern Meadowlark, 1; Red-winged Blackbird, 1; Cowbird, 1; Cardinal, 17; Evening Grosbeak, 4; Red-eyed Towhee, 1; Slate-coloured Junco, 108; Tree Sparrow, 307; White-crowned Sparrow, 2; White-throated Sparrow, 1; Song Sparrow, 14. Total, 46 species, 10,865 individuals. The Gallinule was found dead at Sunnyside Beach but was lying on top of the snow and was quite fresh. There were evidences of it having been killed by striking electric transmission wires which pass overhead at this point. The specimen is now in the R.O.M.Z. collection. The Iceland Gull was identified also at Sunnyside, by J. M. Speirs, who was able to examine it through a telescope under most favorable circumstances and note all possible marks of identification. Three species are new to Brodie Club Christmas census lists; Iceland Gull, Cowbird and White-crowned Sparrow. — THE BRODIE CLUB, Per. R. J. RUTTER, *Secretary*.

Observers: J. L. BAILLIE; H. BARNETT; F. BARRATT; D. BEACHAM; A. L. BELDAN; G. BEARE; G. BELL; R. BENNETT; E. BOISSONNEAU; A. BOISSONEAU; R. G. CUMMINGS; A. F. COVENTRY; O. E. DEVITT; F. H. EMERY; D. FORBES; W. GUNN; P. HARRINGTON; C. E. HOPE; G. LAMBERT; W. C. MANSELL; D. S. MILLER; L. A. PRINCE; G. H. RICHARDSON; R. RUSSELL; R. J. RUTTER; R. M. SAUNDERS; T. M. SHORTT; F. SMITH; L. L. SNYDER; M. SPEIRS; H. H. SOUTHAM; T. SWIFT; S. L. THOMPSON; H. WOOTTON; R. B. WOOTTON.

HAMILTON, ONT.—December 26, 1938; 7.15 a.m. to 6.15 p.m. Clear at dawn to overcast at night, 1 to 6 in. of snow on ground, harbour open, wind light, south-east, temp. 24° to 39°. Seventeen parties covered the regular census routes from Stoney Creek to Burlington and Lake Medad, the Dundas Valley west to Ancaster, Hamilton and Harbour, and Bronte. Loon (sp. ?) 1; Horned Grebe, 1; (Whistling ?) Swan, 1 imm.; Mallard Duck, 10; Black Duck, 215; Baldpate, 1; Pintail, 3; Ring-necked Duck, 1; Canvas-back, 1; Greater Scaup Duck, 167; American Golden-eye, 280; Buffle-head, 1; Old-squaw, 9; Hooded Merganser, 4; American Common Merganser, 452; Red-breasted Merganser, 11; Cooper's Hawk, 2; Red-tailed Hawk, 8; Common Rough-legged Hawk, 3; Bald Eagle, 1; Marsh Hawk, 3; American Sparrow Hawk, 8; Ruffed Grouse, 68; Gray Partridge, 27 (3 coveys); Common Pheasant, 230; American Coot, 3; Glaucous Gull, 3; Great Black-backed Gull, 111; Herring Gull, 3235; Ring-billed Gull, 19; Bonaparte's Gull, 7; Mourning Dove, 1; American Screech Owl, 8; Great Horned Owl, 4; Snowy Owl, 1; American Long-eared Owl, 1; Belted Kingfisher, 1; Yellow-shafted Flicker, 6; Pileated Woodpecker, 1; Hairy Woodpecker, 18; Downy Woodpecker, 70; Northern Horned Lark, 2; Blue Jay, 33; American Crow, 82; Black-capped Chickadee, 351; White-breasted Nuthatch, 69; Brown Creeper, 12; American Robin, 10; Hermit Thrush, 1; Golden-crowned Kinglet, 10; Northern Shrike, 3; Common Starling, 1798; English Sparrow, 1564; Eastern Meadowlark, 15 (one flock); Cardinal, 26; Common Purple Finch, 2; Common Redpoll, 1; American Goldfinch, 3; Slate-coloured Junco, 417; Tree Sparrow, 561; Song Sparrow, 19; Snow Bunting, 4. Total, 62 species, 9,980 individuals.—HAMILTON BIRD PROTECTION SOCIETY (F. H. Butcher, Iris Davenport, Mrs. J. G. Farmer, Oliver Hewitt, H. E. Kettle, Miss J. M. Magee, Eleanor Malcolm, Mrs. F. E. MacLoghlin, Dr. and Mrs. G. O. McMillan, Ruby Mills, H. D. Mitchell, Mrs. J. P. Morton, George W. North, Mr. and Mrs. H. C. Nunn, George Sackrider, James Savage, Graham

Simpson, Wm. Vaughan, Wm. J. Wallace, J. H. Williams); TRAIL BLAZER'S ASSOCIATION (Bob Elstone, Maurice Hackman, Kenneth Hannigan, Donald Hassell, John Lord, Jack Martin, Douglas McCallum, Leonard Pollard, Blair Ronald, Douglas Simpson, Milton Wallace, Bob White).—per G. W. NORTH.

VINELAND STATION, ONT.—December 24, 1938; 8.30 a.m. to 1.00 p.m. Clouded; light covering of snow; wind, west; temp., min. 33.3°, max. 35.5°. West bank of Jordan Pond, Lake shore, Experimental Farm, Ball's Falls. 5 miles on foot, 5 by automobile. Greater Scaup Duck, 3; Lesser (?) Scaup Duck, 2; Cooper's Hawk, 1; Ruffed Grouse, 3; Common Pheasant, 4; Herring Gull, 15; Mourning Dove, 70+ (1 flock of 60); Downy Woodpecker, ; Blue Jay, 2; American Crow, 5; Black-capped Chickadee, 10+; White-breasted Nuthatch, 2; Hermit Thrush, 1; Golden-crowned Kinglet, 9+; Common Starling, 11; English Sparrow, 250+; Cardinal, 2; Slate-coloured Junco, 20+; Tree Sparrow, 10; Song Sparrow, 1; Snow Bunting, 3. Total, 21 species, 425+ individuals. December 26, Lapland Longspur, 250 (est.)—(Ross).—DR. W. E. HURLBURT, J. STRONG, D. A. ROSS.

SIMCOE, ONT. (Lynn Valley, Port Dover and Turkey Point).—December 26, 1938; 8.30 a.m. to 4.00 p.m , 7½ hours in the field. Dull, with light snow flurries, southwest wind; 3 to 4 in. snow on the ground. Two parties; one afoot, the other by car. Black Duck, 17; Ring-necked Duck, 1; American Rough-legged Hawk, 1; Herring Gull, 426; Belted Kingfisher, 2; Downy Woodpecker, 6; Blue Jay, 7; American Crow, 6; Black-capped Chickadee, 38; White-breasted Nuthatch, 11; American Robin, 3; Golden-crowned Kinglet, 9; Common Starling, 12; English Sparrow, 29; Cardinal, 2; American Goldfinch, 30; Slate-coloured Junco, 7; Tree Sparrow, 14; White-throated Sparrow, 2 (K. Beemer, F. North and R. Gardiner); Song Sparrow, 5; Snow Bunting, 8. Total, 21 species, 636 individuals. Dec. 25th, American Golden-eye, 10; Old-squaw, 12; American Common Merganser, 3; Bald Eagle, 2; Bonaparte's Gull, 2; Great Horned Owl, 1. (Eagles identified by K. Beemer with 8-powered binocular. White head and tail on both birds.)—WILLIAM KIRKWOOD, FRED NORTH, KINLOCH BEEMER and RALPH GARDINER, members of the J. W. CROW NATURE CLUB.

KITCHENER AND WATERLOO, ONT.—December 29; 12 00m. to 4.00 p.m. Cloudy, clearing about 2.00 p.m. for a short time; wind, northeast, moderate; almost 12 in. snow; temp. about 12° Four observers in one party, 8 miles by auto, 5 on foot. German Mills and Cressman's Park. Common Pheasant, 1; Hairy Woodpecker, 3; Downy Woodpecker, 2; Blue Jay, 3; Black-capped Chickadee, 35; White-breasted Nuthatch, 2; Brown Creeper, 2; Golden-crowned Kinglet, 7; Common Starling, 15+; English Sparrow, 50+; Cardinal, 2; Pine Siskin (?), 3 (plus a group of about 15); Slate-coloured Junco, 25; Tree Sparrow, 15; Song (?) Sparrow, 1. Total, 15 species, 181+ individuals. Seen within the past month or so: Herring Gull, American Screech Owl, Eastern Crow (1), Snow Bunting (several flocks).—G. W. KNECHTEL, preparator of report. Submitted via R. A. BOOTHBY, *Secretary*, Kitchener-Waterloo Naturalists' Club. Observers: F. W. R. DICKSON, F. H. MONTGOMERY, C. B. PRICE, F. A. SHANT .

LONDON, ONT. (Vicinity of).—December 27, 1938. Day cold and sky overcast. Temperature about 6°. Visibility very limited by stiff south-west gale and thick drifting snow throughout the day. Observers in nine parties covering a distance of about 35 miles, in the morning only. Hours afield, 31. Mallard Duck, 3; Black Duck, 43; Pintail, 1; American Golden-eye, 2; American Common Merganser, 96; Red-tailed Hawk, 3; American Rough-legged Hawk, 6; Bald Eagle, 1; Ruffed Grouse, 2; Common Pheasant, 34; Herring Gull 39; Ring-billed Gull, 1; American Screech Owl, 1; Great Horned Owl, 4; Belted Kingfisher, 5; Yellow-shafted Flicker, 1; Yellow-bellied Sapsucker, 1; Hairy Woodpecker, 8; Downy Woodpecker, 30; Arctic Three-toed Woodpecker, 1; Blue Jay, 19; American Crow, 211; Black-capped Chickadee, 130; White-breasted Nuthatch, 28; Brown Creeper, 3; American Robin, 1; Golden-crowned Kinglet, 78; Common Starling, 54; English Sparrow, not counted; Eastern Meadowlark, 1; Rusty Black-bird, 1; Cardinal, 94; Common Purple Finch, 9; American Goldfinch, 30; Slate-coloured Junco, 107; Tree Sparrow, 43; White-throated Sparrow, 1; Song Sparrow, 1; Lapland Longspur, 50; Snow Bunting 4. Total 40 species, 1147 individuals, plus English Sparrows. Seen recently: Bob-white. Snowy Owl, American Long-eared Owl, Short-eared Owl, Red-bellied Woodpecker, Northern Shrike.—Mrs. W. J. Bigelow, Donald Bourne, Neil Bourne, R. D. F. Bourne, R. Brown, Dr. G. Cummings, Wm. Lott, Eli Davis, Miss K.

Fetherston, W. G. Girling, R. T. Hedley, Miss F. Jacobs, W. Jarmain, Mr. and Mrs. E. McKone, W. Morris, Keith Reynolds, Dr. W. E. Saunders, R. Stanfield, W. D. Sutton, Miss Theodie and Miss R. Westcott.—KEITH REYNOLDS Chairman of Census Committee, McILWRAITH ORNITHOLOGICAL CLUB.

MEAFORD, ONT.—December 28. Cold and fair. Eight observers in two parties travelled 3 miles along shore of Georgian Bay. American Golden-eye, 6; American Common Merganser, 70; Ruffed Grouse, 5; Gulls, 300 (a few Ring-billed Gulls, the rest Herring Gulls); Pileated Woodpecker, 1; Downy Woodpecker, 1; Blue Jay, 2; Black-capped Chickadee, 22; White-breasted Nuthatch, 1; Brown Creeper, 1; Hermit Thrush, 1; Golden crowned Kinglet, 2; Common Starling, 71; English Sparrow, 80; Cardinal, 2; Common Purple Finch, 2; Pine Grosbeak, 10; Total, 18 species, 577 individuals. Other species observed December 25 and 26: Canvas-back, 1; Scaup Duck, (sp.?) 2; Old-squaw, 1; Red-breasted Nuthatch, 1; American Robin, 2; Northern Shrike, 1; Evening Grosbeak, 1; Slate-coloured Junco, 1; Tree Sparrow, 5.—L H. BEAMER, for *Meaford Natural History Club.*

CRESCENT, B. C.—December 28; 9.00 a.m. to 4.00 p.m. Dull; wind northeast, light; 6 in. snow; temp. 34°. Coastline and road between Ocean Park and Crescent Beach. Two observers together on foot. Common Loon, 8; Horned Grebe, 6; Western Grebe, 4; Cormorant (sp. ?), 2; Northwest Coast Heron, 4; Black Brant, 17; Mallard Duck, 40; Pintail, 5; Green-winged Teal, 4; Canvas-back, 12; Greater Scaup Duck, 5; American Golden-eye, 7; Buffle-head, 13; Harlequin Duck, 3; White-winged Scoter 200+; Surf Scoter, 200+; Hawk (sp. ?), 1; Killdeer Plover, 1; Black-bellied Plover, 3; Sandpiper (Least ?), 12; Sandpiper (Red-backed ?), 200+; Glaucous-winged Gull, 27; California (?) Gull, 3; Red-shafted Flicker, 2; Gairdner's Woodpecker, 1; Western Crow, 3; Oregon Chickadee, 14; Western Winter Wren, 3; Varied Thrush, 5; Golden-crowned Kinglet, 1; Ruby-crowned Kinglet, 1; California Purple Finch, 1; Oregon Towhee, 4; Savannah (?) Sparrow, 1; Slate-coloured Junco, 1; Oregon Junco, 150+; Rusty Song Sparrow, 14; Sparrow (sp. ?), 1; Total, 38 species, 979+ individuals.—MARTIN W. HOLDOM and MARY W. HOLDOM.

OBITUARY NOTICE

The death of Mrs. W. A. Cassels of Red Deer, Alberta, at the Municipal Hospital on November 12, 1938, will come as a shock to her many naturalist friends throughout Canada.

Mrs. Cassels was in her 75th year and had lived in Red Deer for nearly 40 years. Born in St. Mary's Loch, Scotland, she came to Canada in 1889 with her husband and homesteaded at Wavy Lake, Alberta, and shortly after settled on their own farm at Springvale. Some years later they moved to Red Deer where they have resided ever since.

During the past half century Mrs. Cassels took a great interest in birds. She kept a diary in which she noted the migratory habits of her many feathered friends; and by her keen enthusiasm stimulated a wide interest in the study of ornithology. She was a member of the Alberta Natural History Society and took an active part in its proceedings for many years.

Mrs. Cassels was a woman of charm and culture and all those who had the pleasure of knowing her will feel her passing as a decided personal loss. — C.B.H.

NOTES AND OBSERVATIONS

BANDED KITTIWAKE FROM RUSSIA RECOVERED IN NEWFOUNDLAND.—The National Parks Bureau, Department of Mines and Resources, Ottawa, which has custody of the official bird-banding records for Canada has received information to the effect that a Kittiwake, *Rissa tridactyla* L., taken near Little Fogo Island, Newfoundland, on September 20, 1937, carried ring No. 51412 of the Central Bureau of Birringing, Moscow, which had been placed on this bird at the Island of Kharlov on June 19th, 1937. The Island of Kharlov is about 200 miles inside the Arctic Circle, lying in the Barents Sea off the coast of Murmanski Bereg, in that part of northern Russia adjoining Finland.

The Department of Natural Resources, Com-

mission of Government, St. John's, Newfoundland, is responsible for this interesting and valuable migration record finding its way into the official bird-banding records for North America.

Bird banding as a means of scientific ornithological investigation, as well as a practical aid to solving certain conservation problems concerning wild birds is proving its worth, particularly in recent years during which time much exact and useful information has been obtained relative to bird biology.

It is practically a world-wide investigation, being conducted in North America, India, Turkey, Japan, and in 22 countries of Europe. The Canadian, Newfoundland, and United States Governments Co-operate fully in this effort in North America, and persons who recover banded birds should help with this important work by reporting the facts to the Bureaus concerned.— HOYES LLOYD.

WESTERN BLUEBIRD NOTES.—During the past five years, it has been a pleasure to watch the activities of a pair of Western Bluebirds *Sialia mexicana*, who make use of the nesting boxes placed about the buildings on our ranch near Abbotsford, British Columbia. Four nesting boxes were put up, two on posts and two on the buildings. One of these, a four compartment birdbox, was used in 1933 by a pair of Violet-Green Swallows, but since then, House Wrens have each year held possession against all comers including numerous English Sparrows. The other three boxes have been fought over annually, by the bluebirds and Violet-green Swallows. In 1933 the swallows took possession of the nesting box on the south side of the house. The nest building had been completed and the eggs laid when the bluebirds managed to drive away the swallows and then build a nest for themselves on top of the swallows nest and eggs and here the bluebirds successfully raised two broods of four each. On being driven from their first home the swallows immediately took up housekeeping duties in one of the other boxes and were not further molested by the bluebirds. The fight is continued each spring until now the bluebirds have nested in each box in turn. Once the real nesting activities begin on both sides, both bluebirds and swallows seem more tolerant of each other.

The bluebirds are most amusing in the way they keep house and care for the young and they go through the same performance each year. The first brood is brought off and then within a few days the old birds are busy laying and brooding again. When the second brood fledges, both families, usually eight young and the two adults, join in one flock and remain in the neighbourhood, visiting the garden every few days until it is time to leave for a warmer climate. The young of the first family are fed and cared for while the second clutch of eggs is being incubated.

As mentioned above these bluebirds have gone through the same actions during the past five years and this, the sixth year, is no exception as at the time of writing the old birds are incubating a second set of eggs, the first brood having safely taken off on Wednesday, June 1st. The nest was reoccupied five to seven days later; the exact date was not determined as the writer was absent from the ranch at the time. — KENNETH RACEY.

THE SUNKEN FOREST AT LONG ISLAND, N. S. — On the occasion of the conjoint meeting at Wolfville, N.S., in August, 1937, of the Botanical Society of America and the American Society of Plant Taxonomists a visit was paid to the sunken forest at Long Island. Little of the forest now remains except scattered stumps with the roots still in their original position although covered at high tide to a depth of 35 feet. Various opinions were expressed by the visitors in regard to the species represented but these were only speculations. Close to one group of spreading roots I noticed a cone of White Pine in a fair state of preservation. Samples of the wood were obtained and brought to Ottawa for further examination. These were eventually submitted to Mr. J. D. Hale of the Forest Products Laboratory who had no difficulty in identifying the wood as that of White Pine (*Pinus strobus*). Whether all the tree stumps are of this species I am unable to say as the sample I collected was taken from a tree whose roots were still in a fairly good state of preservation. — J. ADAMS.

CORRECTION.—Mr. Stuart Criddle advises that certain change should be made in his article "Thirteen-striped Ground Squirrel in Manitoba," published on pages 1-6 of this volume. In the table on pages 2 the term "average" does not apply to the McCreary specimans of which there were only two. On page 1, column 2, last line, and page 3, column 2, third paragraph, lines 24 and 25, the word"grams" should be used instead of "milligrams."

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Andrew Halkett

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VOL. LIII OTTAWA, CANADA MARCH, 1939 No. 3

ANDREW HALKETT

NATURALIST

1854 - 1937

THE SPECIALIZATION of modern times makes the rise of any amateur naturalist to professional rank more and more unlikely. Andrew Halkett was a son of the manse. His father was Reverend Andrew Halkett, for many years minister of the first charge of the Cathedral, Brechin, Scotland, and minister of St. Andrew's Church, St. John, New Brunswick, from September, 1843, until early 1847. His mother was a Canadian, Frances Ann Taylor of United Empire Loyalist stock from Fredericton, New Brunswick. He was born at Brechin, Shire of Angus, Scotland, on October 28, 1854. Next we find him with a position in the Bank of Montreal at Ottawa, in 1873, and later, 1878, he received a minor clerical appointment in the Dominion Civil Service, Department of Marine and Fisheries. Mr. Halkett married Emma McGowan in 1879; she pre-deceased him in 1934. One daughter, Margaret, survives, and to her we are indebted for the basic facts in this notice of her father's life and work. Andrew Halkett was bound to be a naturalist, nothing deflected him from his course, and his attainment in his chosen field shows the result of determination and the will to surmount obstacles.

He gained an excellent all-round knowledge of natural history by observation and study, and then, following the advice of Professor John Macoun, turned his studies directly to fishes and made them his field for the rest of his life.

He had the urge to carry him upward until he concluded his long and arduous career of fifty-two years government service as Associate Zoologist to the Dominion Department of Fisheries. Being then seventy-five years of age he might have been expected to rest on his achievements. He did nothing of the kind, but enrolled as an occasional student in Philosophy at Manchester College, Oxford.

Mr. Halkett was always a teacher and his strenuous journeys to lecture to the fisherman of the Maritime Provinces did a great deal to gain their good-will for conservation measures by showing that these were reasonable and were founded on scientific facts.

In carrying out his duties as a scientific investigator of the department, Mr. Halkett was active in most parts of the Dominion, the Arctic, the Pacific, the Prairies, and the Maritime Provinces; few had so broad a knowledge of the length and breadth of Canada.

In the Ottawa Field-Naturalists' Club Mr. Halkett found congenial naturalist friends. He was prominent in the affairs of the Club from 1894, serving on various committees, then as Secretary from 1895 to 1898, and as President for 1910-11. Excursions were a main interest and he was a regular leader at them. Often I have seen him surrounded by a group of students, and entering into the full fun of telling some of the many things in nature he knew. His firs natural history article, "Ottawa Phyllopods", appeared in *The Ottawa Naturalist* for July 1895.

One of his early important natural history assignments was to spend the summer of 1896 on board the sealing schooner *Dora Sieward*, operating in Behring Sea. His duty on this voyage which lasted from July to October was to study the condition and habits of the fur seal at sea. The *Canadian Fisherman* tells of his getting adrift in Behring Sea with two Indians in a dugout canoe during a snowstorm. The account relates that he withstood the hardship of trying days and nights better than the Indians, and that he never lost his nerve. Fortunately

all were rescued by a United States revenue cutter

In 1900 he spent ten months at the Paris Exposition in connection with the Canadian Government's natural history exhibit; being personally awarded a medal and diploma by the Republic of France. There were other important fisheries exhibits under his direction, as at New Westminister, British Columbia, four successive years, 1907-1910, for which the Industrial Association of British Columbia awarded him a medal, and at the Canadian National Exhibition at Toronto, where he represented the department and set up the Dominion Fisheries exhibit in 1913 and 1914, the first two years that the Dominion had an exhibit there.

Mr. Halkett was naturalist to the *Neptune* Expedition to the Eastern Arctic, 1903-4, and wintered at Cape Fullerton, Northwest Territories. His record of the birds of the expedition was published in *The Auk* (1905) by Eifrig.

For many years Mr. Halkett was Naturalist and Curator of the Canadian Fisheries Museum, and present day Ottawa may forget that this Museum was visited by more than 15,000 persons in 1905. I think he must have been very happy in museum work, although he was not the kind of person to complain of even the hardest tasks.

In the summer of 1907, 1908 and 1909 it was Mr. Halkett's arduous task to survey the fisheries possibilities of many lakes in the Prairie Provinces, Collections were made in triplicate for the Dominion and for the Provinces of Alberta and Saskatchewan. This was well before the general use of the motor car, and even before many of the lakes he visited could be reached by rail. The writer knows well how strenuous an undertaking it must have been to do all that he did in a limited time. To quote Mr. Halkett, "It was pioneering work, but in a year or two ready access will be had to the places as railways are rapidly being constructed". The reports contain a great many notes of the abundant bird life found about these lakes at the time.

The investigation of oyster fisheries was one of the important natural history problems to which Mr. Halkett devoted much attention. His studies of the beds and his comments on their management always had an intensely practical side; he was perpetually looking for the advancement of the fishermen; he always taught them the principles of conservation.

Similarly, great attention was given to scallop studies and explorations, again with the practical end in view of showing that there were many places where it was useless to drag for them. Valuable contributions he made in this research related to rates of growth of this species and to the determination of spawning time; both of which helped as being fundamental facts on which seasons and other conservation measures could be based.

Mr. Halkett devoted many years to the study of the lobster, and spread the knowledge he had of this crustacean by lecturing to the lobster fishermen of the Maritime Provinces. The fishermen easily saw that he knew whereof he spoke, and duly appreciated him in consequence. His scientific investigation of the lobster began in Cape Breton in 1909 with determination of sizes, study of metamorphoses, the nauplius stage and moults, and determination of details of reproduction. Until he retired in 1929, the Maritime Provinces received the benefit of this work.

His *magnum opus* was a "Check List of the Fishes of the Dominion of Canada and Newfoundland", an illustrated book of 138 pages, published by his department in 1913, now long since out of print. I am sure that one of the most appreciated of the many favourable comments on this work came from Professor Macoun, who had long before started Mr. Halkett on his ichthyological career.

Many-sided in all things, Andrew Halkett had an enquiring and independent mind in religious matters as shown by the fact that starting from a Presbyterian manse he later joined the Plymouth Brethren, and finally became one of the founders of the Unitarian Church, Ottawa.

There was a song in Andrew Halkett's heart both literally and figuratively. He was a little man with a big voice, and whether singing as a young man in the choir of St. Andrew's church at Ottawa, or helping the fisherfolk of Little River, Nova Scotia, earn $50.00 at a public concert, he was happy to use his talent.

Although I had not the pleasure of knowing him when he was young, it is apparent from his letters that he had the joyous faculty of looking upon the bright side of life; even as an old man, his dry humour enlivened any conversation with him.

The photograph of Mr. Halkett reproduced herewith was taken just before his 82nd birthday.

Andrew Halkett died at Ottawa on May 18, 1937, having given a lifetime of service to the country he adopted.—HOYES LLOYD.

NESTING OF THE RED-BREASTED NUTHATCH (Sitta canadensis)

By CHARLES MACNAMARA

ONE FINE and very hot day in the middle of June we set out in my friend's old Ford for Lowney's Lake, ten miles south of Arnprior, to photograph pitcher plants which abound in a bog there. The bog was very wet. For a while we tried to keep our feet dry by stepping from tussock to tussock, but we soon slipped into the water and then we sloshed around regardless. As we were focussing a plant near the edge of the bog we heard a man stepping cautiously through the woods towards us. When he got close enough to see us he came frankly forward and told us he had taken us for the cattle thieves that had been operating lately in the vicinity. He lived in a near-by log house, and having once been a village constable, he was keenly on the watch for wrong-doers. However, when he saw our innocent pursuit as flower photographers, he gave us an honorable acquittal. At one time and another on our outings we have been mistaken for surveyors, deer hunters, prospectors, road engineers and land speculators. This was an addition to our imputed occupations: never before had we been taken for cattle thieves.

We crossed the road to a rough little field surrounded by thick woods, and sat down to eat our lunch while our boots and socks dried on a rock in the hot sun.

It was the height of the mosquito season, and with all the swamps and bush around, the pests should have been at their worst in our little sheltered clearance. But we witnessed nothing less than a miracle. The prophet Elijah was fed beside the brook Cherith by ravens. We were protected from mosquitoes at Lowney's Lake by dragon-flies. A vast swarm of these voracious insects was shuttling in and out and to and fro over the field, grazing our heads and whirring their wings in our ears, and not a mosquito was to be seen. Blessing the whole order *Odonata*, we ate our lunch in undisturbed comfort.

Presently we noticed a pair of Red-breasted Nuthatches, *Sitta canadensis*, flying back and forth overhead. They were carrying food to their young and their nesting hole was in a 20-foot balsam stub at the edge of the field near the road. I remarked to my friend: "You remember that the Red-breasted Nuthatch is said always to smear gum around the entrance to its nest. We are now going to see if the statement is true." Our foot-gear was still wet, so unshod we gingerly picked our way across the stubbly field; (it is long since we were barefoot boys with cheek of tan). The nesting hole, two inches in diameter, was seven feet from the ground; and there was a band of gum, roughly three-quarters of an inch wide, all around it, and some clear tears had run down the bark below the hole. The gum was Canada balsam, the exudation of *Abies balsamea*, and not pine or spruce gum, as stated by some authors. It was fresh and sticky and had evidently been brought there recently by the birds. It had not oozed from the nesting tree, which was long dead and perfectly dry.

Anyone who has collected Canada balsam from its native tree knows how thin and extremely sticky the fresh gum is. The birds must gather it fresh, for the dried gum could not be painted around the hole. I do not know if anyone has seen them actually at work, but they probably get the gum by piercing the blisters on the bark which contain it. But how they manage to carry it to the nest and spread it around the entrance without getting their beaks and feathers hopelessly stuck with this thin and highly viscid substance, is a mystery to me.

By standing precariously on a broken barrel that we found near the fence. I was able to photograph the nest hole. Unfortunately, the surrounding gum did not show plainly on the rough bark, although the drops that ran down the tree were fairly conspicuous. The birds showed a little uneasiness at our presence, but not much; they kept on carrying in food while we stood within three feet of the tree. They arrived alternately at intervals of three or four minutes, bringing mostly small green caterpillars; once the male came with a large horse-fly (*Tabanus sp.*). Invariably the male clung for a few seconds to the bark at the left of the hole before he entered, which gave me a good chance to photograph him; the female always darted straight in. From time to time they carried away the excrement of the young birds in their bills. The parents looked quite worn-out and their plumage was shabby and dishevelled. The female had no red tinge at all on her breast, the feathers were all grey. I sounded the hole with my finger but could not reach the bottom, nor did I touch the young birds. But I got my hand smeared with the gum around the hole.

A week later I visited the nest again with another friend. The birds were working as hard

as ever; evidently they had been keeping up the terrific pace all week and they looked even shabbier than before. As on our first visit, the female, after lighting on a withered branch of the tree, darted straight into the hole; the male always rested a moment on the trunk beside the hole before he went in. The week before we did not see any of the young birds, but today, grown larger, one or other of them looked out for a few seconds.

A quick interchange took place between a nestling and the mother, but the action was so rapid that it was hard to say just what had happened. I asked my friend: "Did you see what I think I saw? It seemed to me that the young bird presented an excrement mass in its bill to the mother who took it and flew away with it". "Yes", my friend said, "that was what I saw." We watched carefully and saw the procedure again clearly. The young birds were taking an early part in nest sanitation. Mostly, however, the old birds put their heads down the into the hole and picked up the excrement themselves. The alternate trips of the parents were taking place at intervals of a little less than five minutes; but once the male was away for 20 minutes and the female alone kept up the stream of green caterpillars. Apparently the paternal instinct was less enduring than the maternal and father was loafing somewhere on the job. But at last he came flying in with a large slimy slug which he jammed into the gape of a nestling; it must have filled the young bird up to the neck. Then the regular schedule began again, mother and father one after the other, and kept up as long as we were there.

Forbush says that the origin and possible utility of the gum smearing habit has never been satisfactorily explained. One writer states that he saw the young birds picking at the gum and infers that it was an insect trap. Another writer suggests that it is intended to keep out large ants and mice. The habit does not extend to our other Nuthatch, the White-breasted, *Sitta carolinensis*, which also nests in a hole in a tree. But strangely enough, the Old World Nuthatch, *Sitta caesia*, works on the entrance to its nest although it does not smear gum around it. This nuthatch does not dig out a hole for itself but nests in a chance opening in a tree or an abandoned woodpecker excavation, and when the entrance is too large to suit its purpose, the bird closes in the hole with a cement of mud tempered with saliva, leaving an opening just large enough for its small body to slip through. According to Brehms Tierleben, the cement sets so hard that it can only be cut with a chisel.

*ADDENDA TO A PRELIMINARY LIST OF THE BIRDS OF LINCOLN AND WELLAND COUNTIES, ONTARIO, (1936)**

By R. W. SHEPPARD

SUBSEQUENT to the completion of our *Preliminary List of the Birds of Lincoln and Welland Counties*, in December, 1935, further field work by the authors, combined with the acquisition of some extensive notes, and unpublished lists, made available to the writer through the courtesy of other observers, notable Mr. W. L. Putnam of the Dominion Entomological Labratory at Vineland, and Mr. G. J. Clout of St. Catharines, has added very materially to the sum total of our knowledge of the avifauna of this district, and revealed the occurrence of a number of additional species within the area.

The following supplementary list not only adds 17 species to the 240 previously dealt with, but also confirms or gives definite status to certain of the species in our original list which were there mentioned only in an inconclusive or hypothetical sense. An asterisk is used to denote those species which were specifically, but inconclusively dealt with in our original list, and are now given confirmation as to occurrence within the area; while those which are straight additions to the list are without such preceding mark.

Although much additional information regarding the status of a number of the species dealt with in our original list has been accumulated since the completion of that list in 1935, it has been considered advisable to confine these addenda to previously unreported species, and the confirmation of doubtful records.

**Gavia stellata* (Pontoppidan). RED-THROATED LOON.—Reported in the original list from the Niagara River, but without definite status on

* *Can. Field-Nat.* 50, Sept.-Dec. 1936, pp. 95-102, 118-122, 131-140, 149-152.

the Ontario side, this loon has since been recorded by the Buffalo Ornithological Society from the west side of Navy Island in Canadian waters, on October 14, 1936. According to Mr. W. L. Putnam, a Red-throated Loon was found dead on the lake shore at Vineland in Lincoln County on April 14, 1934.

Anas rubripes rubripes Brewster. RED-LEGGED BLACK DUCK.—Following observations of the past two or three years, it has now been ascertained beyond doubt that the Red-legged as well as the Common form of the Black Duck occurs regularly in winter on the Niagara River, and is of quite frequent occurrence on the Canadian side.

**Chaulelasmus streperus* (Linnaeus). GADWALL. Mentioned in our original list as of probable occurrence on the Ontario side of the Niagara border, we can now record a female bird of this species observed on April 19, 1937, in the Niagara River below the Falls near the Canadian *Maid of the Mist* landing.

**Nettion carolinense* (Gmelin). GREEN-WINGED TEAL.—Recorded in our original list as of probable, but indefinite, occurrence within the confines of the area, this teal has since been reported by the Buffalo Ornithological Society from Dufferin Islands near Niagara Falls, Ontario, on December 5, 1937, and from Point Abino in Welland County on September 3, 1938.

Querquedula discors (Linnaeus). BLUE-WINGED TEAL.—Frequently observed on the Niagara River near Fort Erie during the summers of 1937 and 1938. Occurring in small numbers in late spring, and in larger numbers, sometimes exceeding 100 in one aggregation during August and September.

Somateria mollissima dresseri Sharpe. AMERICAN EIDER.—The obtaining of a young male American Eider from a small party of three similarly plumaged ducks on the Ontario side of the Niagara River near Navy Island, on November 21, 1936, has already formed the subject of a special note[1] by the writer, and need not be dealt with further here.

Falco columbarius columbarius Linnaeus. EASTERN PIGEON HAWK.—On April 1938, a small falcon, undoubtedly referable to this species, was kept in view for some time as it coursed through young peach orchards near Beamsville, in Lincoln County, skimming the tops of the trees or flying down the rows in swift easy flight notwithstanding a very strong wind that was blowing at the time. In the Buffalo Ornithological Society's mimeographed journal *The Prothonotary* for September, 1938, Messrs. Savage and Mitchell record the observation of a Pigeon Hawk at Port Colborne in Welland County on September 11, 1938.

Ionornis martinica (Linnaeus). PURPLE GALLINULE.—On September 11, 1937, Mr. G. J. Clout of St. Catherines observed two Purple Gallinules at Jordan Harbour in Lincoln County. This exceedingly interesting occurrence was mentioned by Mr. J. L. Baillie in an article in the Toronto *Evening Telegram* for January 8, 1938.

Ereunetes mauri Cabanis. WESTERN SANDPIPER.—Mentioned in our original list as of possible occurrence (see account of Semipalmated Sandpiper),[2] this species has recently been recorded by the Buffalo Ornithological Society as occurring in Welland County. The mimeographed journal of that society *The Prothonotary* carried several reports by J. Savage and others of Western Sandpipers at Long Beach during August, 1937, while in that same journal for September, 1938, there is a record of one seen at Fort Erie on the 18th of the month.

Larus kumlie i Brewster. KUMLIEN'S GULL.—Of late years there have been a number of observations of Kumlien's Gull on the Niagara River and two of these by the writer can be definitely assigned to the Canadian side, in Welland County. One on January 29, 1937, near the Peace bridge at Fort Erie,[3] and another bird with a very restricted wing pattern, near Plamer's Marsh, on December 29, 1937.

Larus atricilla Linnaeus. LAUGHING GULL.—An observation of the Laughing Gull at Fort Erie, in Welland County on September 18, 1937, together with other reported occurrences, has already been recorded[4] by the writer in a note to this journal entitled *Rare Gulls at Fort Erie on the Niagara River.*

Larus pipixcan Wagler. FRANKLIN'S GULL.—Within the past year or two, several Franklin's Gulls have been reported from the Niagara River by the Buffalo Ornithological Society, and one of these records, covering an individual seen at Fort Erie in Welland county on October 17, 1937, can be definitely assigned to the territory in question.

Xema sabini (Sabine). SABINE'S GULL.—The Buffalo Ornithological Society's journal *The*

[1] *Can. Field-Nat.* 51:59, April 1937.

[2] *Can. Field-Nat.* 50:121, Oct. 1936.

[3] *Can. Field-Nat.* 52:62, April 1938.

[4] *Can. Field-Nat.* 52:62, April 1938.

Prothonotary for October, 1937, carries a most interesting account, by H. D. Mitchell *et al.*, of an observation of a Sabine's Gull on the Niagara River at Fort Erie in Welland County, on October 3, 1937.

Asio flammeus flammeus (Pontoppidan). SHORT-EARED OWL.—Mr. W. L. Putnam's unpublished list contains a record of an individual of this species noted near Smithville, in the autumn, presumably about the year 1928; while in *The Prothonotary* for February, 1938, the Buffalo Ornithological Society record an observation of a Short-eared Owl on the Canadian shore of the Niagara River, on January 16, 1938.

Otocoris alpestris alpestris (Linnaeus). NORTHERN HORNED LARK.—In our original list, all observations on the Horned Lark were placed under the Prairie Horned Lark; but it now appears certain that the Northern subspecies is also a common visitor to this district for Mr. G. J. Clout of St. Catharines informs me that he has made frequent observations of the Northern bird, and that he can pick out the two forms in the field without difficulty.

**Hylocichla minima aliciae* (Baird). GRAY-CHEEKED THRUSH.—Mentioned indefinitely in our original list, an example of this thrush was noted by the author near Niagara Falls in Welland County on October 12, 1936. The species has also been observed on several occasions by Mr. W. L. Putnam at Smithville, and Vineland during the spring migration period; while on April 24, 1937, Mr. G. J. Clout saw a small flock of from eight to ten Gray-cheeked Thrushes at Port Weller in Lincoln County.

Bombycilla garrula pallidiceps Reichenow. BOHEMIAN WAXWING.—In an unpublished list of bird records from Lincoln and Welland Counties, Mr. W. L. Putnam writes that a large flock of Bohemian Waxwings was seen in Beamsville during the winter of 1924.

Dendroica pinus pinus (Wilson). NORTHERN PINE WARBLER.—Mr. W. L. Putnam observed males of this warbler at the Horticultural Experiment Station, Vineland, on April 24 and 29, and May 21, 1937.

Oporornis philadelphia (Wilson). MOURNING WARBLER.—This species was inadvertently omitted from our original list. Mr. W. L. Putnam states in manuscript that it is probably a regular spring migrant in Lincoln County, and has given us a number of records of occurrence, namely at Niagara-on-the-Lake, May, 1934, and Vineland Station, May, 1935, 1936 and 1937. Mr. G. J. Clout observed a male near St. Catharines on May 21, 1935.

Pinicola enucleator leucura (Muller). CANADIAN PINE GROSBEAK.—According to information received from Mr. W. L. Putnam of Vineland Station, a flock of Pine Grosbeaks was seen in winter neat Smithville in Lincoln County feeding on frozen apples, about 1917 or 1918. The same observer is our authority for the statement that a single female bird appeared at the Horticultural Experiment Station, Vineland, on January 15, 1938.

Melospiza lincolni lincolni (Audubon). LINCOLN'S SPARROW.-In *The Prothonotary* for July, 1936 the Buffalo Ornithological Society report an observation of six pairs of Lincoln's Sparrow at Wainfleet Marsh in Welland County, on June 30, 1936. Mr. W. L. Putnam has given us a record of a single individual identified on May 8, 1937, at Vineland Horticultural Experiment Station in Lincoln County, and Mr. G. J. Clout informed me in a recent letter that he had come across a small flock of Lincoln's Sparrows while travelling through Pelham Township in Welland County, on October 10, 1938.

NOTES ON SOME CRUSTACEA FROM HUDSON BAY

By M. S. FERGUSON
and
N. T. MATTOX

THE INVERTEBRATE fauna of northern Canada and the Arctic regions is gradually becoming better known. Collections from widely separated locations have shown that many forms are rather generally distributed, not only in North America, but also in the northern regions of Europe and Asia The forms discussed here serve to substantiate the above observation since each of the species dealt with has been collected from several localities in the northern hemisphere, and at least two species are considered to be cosmopolitan in distribution.

This paper is based on the study and identi-

fication of five species of Crustacea collected August 20, 1936, by Mr. Douglas Leechman of the National Museum of Canada on the Nuvuk Islands, situated in Hudson Bay about 30 miles southwest of Cape Wolstenholme, Quebec (Lat. 62° 30′, Long. 78° approx.). Each species represents a well-known form, but the present locality of collection, the Nuvuk Islands, is apparently a new record of distribution. The following Crustacean groups are represented: Copepoda, Cladocera, Anostraca and Notostrasa. Each species is here considered individually and Mr. Leechman's notes are supplemented with additional information taken from some of the more recent literature.

Cladocera

Daphnia pulex (de Geer, 1778) was represented by two adult female specimens. This species is very widely distributed and its occurrence may be considered as cosmopolitan. There are a great number of varieties. This is true of the North American forms, but no attempt has been made to classify further the above specimens.

As is the case with most Cladocera, *D. pulex* is found rather abundantly in pools and ponds of various sizes. Juday (1920) gives a brief outline of the life history of this species obtained from a study of the specimens collected by Frits Johansen on the Canadian Arctic Expedition, 1913-18. In the Arctic regions the ephippia, or winter eggs, begin to hatch in June, with most of them hatching during the latter half of the month. The females bearing parthenogenetic, or summer eggs, appear about the first week in July, while the males and females bearing ephippia make their appearance in late July and in August. As is true of many Arctic forms, this species has rather a short life span.

Copepoda

Two species of Copepods were found in Mr. Leechman's collection, namely, *Diaptomus eiseni* and *Paracyclops fimbriatus*. Neither of these species was collected by members of the Canadian Arctic Expedition, 1913-18 (Marsh, 1920).

Diaptomus eiseni Lilljeborg, 1889, was represented by 12 specimens, 6 males and 6 females. This form was originally described from Fresno, California, later collected in 1898 by Brewer at Lincoln, Nebraska, and at Battle Harbour, Labrador, by Cushman in 1908. The specimens considered here represent the fourth record of collection of this species in North America and the second time it has been taken in the north. A variety, *D. eiseni orientalis*, was collected in 1922 by Rylov in Siberia. Marsh (1929) states that *D. eiseni* is apparently the only North American form other than *D. bacillifer* which has been recorded from Asia or Europe. The above notes indicate that this species is apparently very widely scattered but erratic in its distribution.

Paracyclops fimbriatus (Fischer, 1853) was represented by a single specimen. This species, cosmopolitan in distribution, has been recorded from Russia, Sweden, Germany, Poland, Norway, France, Bohemia, Turkestan, the British Isles, Hungary, and in the United States from Minnesota, Ohio, Nantucket Island, Cuttyhunk Island, and Ram's Head Island. It is therefore of particular interest to note that Mr. Leechman's specimen represents the most northerly record of collection for this species in North America. According to Marsh (1929) *P. fimbriatus* is the only described species of this group with an eight-segmented first antenna. It is a bottom form, a poor swimmer, and is apparently never very abundant in a pool.

No information is available to the writers concerning the biology of either *P. fimbriatus* or *D. eiseni*.

Notostraca

This group of Crustacea was represented by about eight specimens of *Lepidurus arcticus* (Pallas, 1793). *L. arcticus* is widely distributed in the circumpolar regions and in the northern parts of Europe, Asia, and North America. It has been reported by various authors from Norway, Sweden, Iceland, Russia, Greenland, Alaska, Labrador, Northern Canada, the Canadian Archipelago, and many Arctic islands (Romer and Schaudin, 1933). Probably the most southerly record of *L. arcticus* in North America is from Port Burwell, Quebec (Lat. 61°). However, collections of this form have been made farther south elsewhere in the world, e.g. records from Kurile Island (Lat 47°) and St. Paul Island (Lat. 57°), one of the Pribilof Islands. Johansen (1922) refers to the writers Scharff and Wesenberg-Lund who state that *L. arcticus* is known from Pleistocene strata in Scotland, Denmark and Sweden.

L. arcticus, although erratic in its occurrence, was taken several times by F. Johansen on the Canadian Arctic Expedition (Johansen 1922). Johansen gives some interesting information on the development and biology of this form based on his own studies and those of other workers both in North America and Europe. He states that the metanauplius and immature stages have been studied, described, and figured by

Sars, Brehm, Olofsson, and himself (1911). The metanauplius stage is apparently suppressed, or of exceedingly short duration. Of the mature individuals the majority are females, and the males, which are usually about half the size of the females, seem to appear only late in the summer (August) and in very small numbers. No study was made by the writers to determine the sex of the specimens collected by Mr. Leechman.

Johansen (1911) and Sars (1896) intimate that they believe individuals of *L. arcticus* may live over the winter in deeper ponds and lakes which do not freeze to the bottom. Mature specimens have been collected in the spring and early summer apparently long before the eggs were hatched or the young individuals could have developed to maturity. Johansen (1922) has noted that in collections made during the summer one finds specimens exhibiting various stages of development, which probably indicates that the eggs do not all hatch at the same time. The same observation has been made by the writers when collecting anostracan fairy shrimps in southwestern Ontario and eastern Illinois.

Anostraca

Several mature specimens of *Branchinecta paludosa* (Müller, 1788) were present in the collection from the Nuvuk Islands. The distribution of this common Arctic fairy shrimp has been discussed by one of the writers in an earlier paper (Ferguson, 1935). Additional information concerning its distribution throughout the world is given by Romer and Schaudin (1933). *B. paludosa*, probably the most widely distributed species of fairy shrimp, has been collected in North America from Alaska, the Yukon Territory, northern Canada, Labrador, and the Canadian Archipelago. It is also commonly found in Europe and Asia and many of the Arctic islands above Latitude 62° 20′. In North America the most southerly record is a collection made about 1890 at Point St. Charles (near Montreal) on Latitude 45° 31′. Strangely enough, *B. paludosa* has never been collected in this region since the original record was made almost fifty years ago.

According to Lynch (1937) there are fourteen recognized species in the genus Branchinecta, five of which have been reported from this continent. The fifth North American species, *B. gigas*, has recently been described by Lynch after a study of specimens collected from temporary alkali ponds in the Upper Grand Coulee in the State of Washington. This is a giant species in which the length of the males ranges from 69 - 70 mm. and that of the females from 69 - 97 mm. This form differs from *B. paludosa* and all other members of the genus in that the second antennae of the female are as long as those of the male.

The specimens of *B. paludosa* collected by Mr. Leechman on the Nuvuk Islands, August 20, 1936, were apparently as mature as those collected by him on the same day two years previously at Churchill, Manitoba (Ferguson, 1935). These localities, one on the east side of Hudson Bay and the other on the west, both lie close to Latitude 60°. As climatic conditions apparently influence the hatching and rate at which fairy shrimps develop, one would naturally expect to find sexually mature specimens of *B. paludosa* in the above regions at about the same time of year.

The eggs of *B. paludosa* usually hatch in June when the northern ice begins to melt at the approach of spring (Johansen 1921). The fairy shrimps develop fairly rapidly and sexual maturity is generally attained by about the middle of August. The males are larger than the females and apparently the sexes occur in approximately equal numbers. Johansen states that the eggs are laid during late August and early September, after which winter soon sets in and the water becomes frozen. When the fairy shrimps occur in deep pools they may live for some time under the ice, a specimen having been collected by Halkett early in November, 1903. As reported by Sars and Johansen, the usual life span of *B. paludosa*, due to the short open season in the north, is approximately four months.

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*RECENT RANGE EXTENSIONS FOR PLANTS**

By HERBERT GROH

IN THE COURSE of botanical survey as well as in routine office services in the Division of Botany plants of more than usual interest inevitably come to our attention from time to time. Among records still unpublished the following seem worthy of note. In each case specimens have been deposited in the herbarium of Science Service, Department of Agriculture, Ottawa.

Halenia deflexa (Sm.) Griseb.—On the occasion of the 1937 summer meeting of the Botanical Society of America held in Nova Scotia an excursion on August 20, to Hall's Harbour on the Bay of Fundy brought me to my first field acquaintance with the spurred gentian. While separated from the party but following the route taken by all through the upper part of the town to, or rather only on the return from, the basaltic cliffs, overlooking the water, the scattered plants of a colony were found in bloom by the roadside. Later enquiry elicited the information that these specimens are probably the first from the Nova Scotian mainland. Nichols (*Vegetation of Northern Cape Breton*, page 324, 1918) reports it as one of the plants of bleak exposed headlands in the north of the island. On August 13, 1929, it was also collected (Perry, *Rhodora* 33, page 124, 1931) on a hillside at Martin Power's Cove, St. Paul Island, off the northern tip of Cape Breton. A specimen from northern Cape Breton collected by C. B. Robinson in 1906 is in the National Herbarium. The plant occurs from Newfoundland westward over much of Canada. A striking observation based on nearly 50 specimens seen in herbaria is that coastal plants are nearly all of dwarfer habit than those from inland points.

Berteroa incana (L.) DC.—Hoary cress was recognized by several members of the same party on the above trip along a roadside near Aylesford, Kings County, N. S., where it had every appearance of having had time to become well established. Our records show its presence in the new England states and at a few places on the lower St. Lawrence, as well as in Ontario, but not in Nova Scotia. One record in Manitoba, 1936, and one in British Columbia, 1930, represent isolated stations farther west.

Erucastrum gallicum (Willd.) O. E. Schultz—This weed, known as dog mustard has now been found in New Brunswick, the last province with the exception of British Columbia in which it remained to be detected since its occurrence in Canada was made known (Groh, *Scientific Agriculture* XIII: 11, 1933). On August 25, 1937, it was collected from a railway crossing at Jacquet River, Restigouche County, N. B. Railway sidings are the most usual sites, but roadsides are frequently infested, and the weed can become abundant in fields.

Asclepias syriaca L.—The common milkweed of eastern America has curiously very little foothold in Nova Scotia and, so far as known, none in Prince Edward Island. Its observation from the train window, July 8, 1930, between Avonport and Hantsport, Kings County, was confirmed by collection of specimens two years later. The small colony growing on the bare railway embankment had grown to several square rods extent in the interval. Through the kindness of Prof. A. E. Roland, Agricultural College, Truro, N. S., I have learned that another colony is also established on a sandy roadside at Auburn, Kings County. This weed is fairly common as far east as Fredericton, N. B., but reaches its peak of abundance in Ontario and the adjoining parts of Quebec.

Cotula coronopifolia L.—Mud disk, a South African Composite which was early well established on the Pacific coast from Vancouver Island

* Contribution No. 573 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.

to California, has been known on the Atlantic coast for even longer but at few stations. In 1879 it was collected by Herbert A. Young in salt marshes at Chelsea, Mass.; and in 1901 J. R. Churchill, whose interesting account may be read in *Rhodora* for February, 1902, found it "growing in deep soft mud by the edge of the marsh" in Summerside, P. E. I. No other reports could be located when, on August 22, 1937, I found it growing profusely and choking a sluggish drainage outlet to Courtenay Bay at East St. John, N B. It is still also at Summerside as shown by a specimen received recently.

Lepidium latifolium L.—As reported in the Progress Report of the Dominion Botanist for the years 1931-1934 inclusive, "A new introduced plant, *Lepidium latifolium* L. a native of Europe, was found in Quebec City, and is well established." The specimens were received from Bro. Marie-Anselm in July, 1934, from the C. N. railway yards. The species has been known from saline soil along the New England coast and in Mexico. Unlike most of our *Lepidiums* it is a perennial.

Salvia lanceifolia Poir.—The lance-leaved salvia, a western American species which seems to be moving eastward as a weed and has appeared in various parts of Europe as well, was submitted in September, 1938, for identification. It had been growing in cultivated corn ground at Jasper, Grenville County, Ont. It has been recorded in Indiana, Ohio and Michigan, but we know of no previous Ontario, or indeed Canadian, records. It is an annual which had matured seeds when seen.

Polygonella articulata (L.) Meisn —Since publication of a note in *The Canadian Field-Naturalist* January, 1926, page 19, in which an Ottawa district (Constance Bay) record was contributed for coast jointweed, this "plant of the sea-coast ranging from Maine to Florida which has also a very local extension of range inland along the Great Lakes system," a number of additional records have accumulated. In 1936 a specimen was received from Miss F. Evelyn Jones which had been collected at Port Alexander, Ont., 33 miles up the Ottawa River from Pembroke and about 20 miles beyond any previously known stations along the Ottawa. A specimen collected by Bro. Marie-Anselm on August 16, 1938, on sand near ballast of the Canadian National railway at Pont Rouge, Portneuf County, Que. extends the known range in another direction. Other specimens collected by myself a few weeks later in station yards of the same railway at Amos, La Ferme and Taschereau, Que., several hundred miles to the west, appear to be the first in Canada away from the St. Lawrence, Ottawa and Great Lakes system. From Amos to Taschereau is a distance by rail of 28 miles. These, and probably the Pont Rouge plants, occur as railway weeds, as if introduced by means of railway traffic, and not so very recently. The distinctly rosy tint of the bloom along the otherwise nearly bare gravel was most striking. It would be interesting to know whether railway yards where traffic originates in other *Polygonella* regions are similarly infested, but published evidence seems to be lacking.

It is of interest to note that the original Constance Bay colony growing at some distance from the shore and never located again, is no longer unsupported evidence of its occurrence at this point on the Ottawa river. During 1938 it was found in abundance by members of the Division staff along the sandy beach. Search for the plant on similar sandy stretches across the river was unavailing but a specimen seen by Dr. H. A. Senn in the Gray Herbarium (Marie-Victorin, Rollard-Germain, and Meilleur, 44942) from Waltham, Que., about opposite Pembroke, proves its occurrence on both sides of the Ottawa River.

*ON THE PARASITES OF THE SMALL INTESTINE OF THE EUROPEAN STARLING (Sturnus vulgaris) IN QUEBEC**

By D. G. CANNON

THE EUROPEAN STARLING, *Sturnus vulgaris* Linn., is a foreign bird to this country. Earliest records tell of its introduction to America by the Acclimatization Society of Cincinnati, Ohio, in the winter of 1872-73. Subsequent liberations of birds were made in 1877 and later in 1890-91 in Central Park New York, and in 1889 and 1892 in Portland, Oregon, thirty-five pairs were liberated. Since this time different numbers of the birds have been liberated until the Starling has spread far westwards and north into Canada.

* Coutribution from the Institute of Parasitology, McGill University, Macdonald College, P. Que., with financial assistance from the National Research Council of Canada.

According to Collinge (1), the bird was introduced into the country in the belief that it would be beneficial to farmers and fruit-growers. There is little doubt but that it has been of some agricultural benefit in that it destroys several species of harmful insects. In late years, however, it has increased in such alarming numbers that it is rapidly becoming a menace to the country. There is the possibility that it may be a carrier of certain parasites harmful to poultry and it was partly with this point in view that this project was undertaken.

Comparatively little study has been made of its intestinal parasites.

Fuhrmann (3) lists the following cestodes:

1. *Choanotaenia musculosa* (Fuhrmann)
2. *Dilepis undula* (Schrank)
3. *Haploparaksis dujardini* (Krabbe)
4. *Hymenolepis farciminosa* (Goeze)
5. *Paricterataenia parina* (Dujardin)

Rayner (8), in 1931, recorded (from starlings in Quebec) *Monopylidium*, while Somner (9), in 1935-36, examined the trachea and intestinal tracts of 132 Starlings collected from several areas in Illinois, and found *Hymenolepis farciminosa*, *Rhabdometra nullicollis* (?) and *Mediorhynchus grandis* (Van Cleave). Lewis recorded two species of nematodes, *Porrocaecum ensicaudatum* and *Capillaria ovopunctata* from their intestinal tracts in Wales

In February, 1937, eleven starlings from Macdonald College grounds were examined for internal parasites. Two species of cestodes, *Hymenolepis farciminosa* (Goeze) and *Choanotaenia musculosa* (Fuhrmann), and a species of *Capillaria* were found.

1. *Hymenolepis farciminosa.*—Several immature specimens were found. Considerable discrepancy in size is exhibited by the mature specimens. The rostellum is armed with a single row of about ten hooks, each hook measuring approximately 0.02 mm. There are three large testes in each proglottid; two near the posterior border of the proglottid and the third located anterior and lateral to the antiporal posterior testis. The uterus is sac-like. Further details of the genital structures were not distinguishable.

Since *Hymenolepis farciminosa* is a parasite of the starling and since the specimens collected appear to correspond to those described by Fuhrmann, Ransom and Mayhew, they are referred to this species.

Choanotaenia musculosa.—Only one complete specimen and a few fragments were collected. The rostellum is armed with two crowns of hooks, the hooks on each crown being of a similar shape and approximately 0.043 mm. in length; no specimen showed complete crowns of hooks. The proglottids are approximately one and a half times as long as they are wide. The gentital pores alternate irregularly. There are about 40 testes situated posterior to the female organs and extending up slightly on each side of the female organs. The uterus breaks down into egg capsules, each capsule containing one egg.

The characters of the specimens found in the starlings would appear to coincide sufficiently with those given by Fuhrmann and Ransom to allow them to be classified as *Choanotaenia musculosa*.

Capillaria columbae var. *sturni.*—Several specimens of this small, hair-like nematode were taken from the small intestines. The length of the female varies from 9.5 to 18.25 mm. (average 12.1 mm.). The oesophagus is approximately one-third of the total length of the worm, the oesophagus and intestine joining a short distance anterior to the vulva which bears an external membranous protrusion, varying slightly in different specimens. The posterior end is bluntly rounded and the anus is slightly sub-terminal. It was only possible to distinguish a portion of one bacillary band and it was approximately half the diameter of the worm. The eggs vary in length from 0.048 to 0.052 mm. and in width from 0.023 to 0.027 mm.

The length of the male varies from 7.0 mm. to 17.25mm. (average 8.45 mm.). The oesophagus is approximately half the total length of the worm The cloacal aperture is nearly terminal and is surrounded by a bursa-like membrane which is expanded anterolaterally, and is supported by two broad rays, each bearing secondary outgrowths. The spicule is approximately 1 mm. long and has a blunt recurved point somewhat resembling a pot-hook. The spicule sheath is 1.4 to 1.8 mm. in length and is regularly annulated centrally, but less so at either extremity; the exact lengths and degree of annulation, however, could not be correctly determined.

Two species of *Capillaria* have been described from starlings in Europe—*C. contorta* (Creplin, 1839) from the oesophagus and *C. ovopunctata* (v. Linst., 1873) from the intestine. The former species has been found in a great variety of birds in various parts of the world (2). It differs from the present species in that it possesses no vulvar membrane and a larger bursal membrane. There is no modern description of *C. ovopunctata* available, however, and it is impossible to say whether the present forms are the same as those

found in the starling in Europe. Moreover, the present form somewhat closely resembles *C. columbae* as described by de Freitas and Almeida ([2]) and by Miller ([6]) from the pigeon, the latter author's material coming from the same locality as did mine In order to avoid subsequent confusion, therefore, I have tentatively regarded my present material as a new variety of *C. columbae*, variety *sturni*.

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SOME NOTES ON HOARDING AND TERRITORIAL BEHAVIOUR OF THE RED SQUIRREL Sciurus hudsonicus (ERXLEBEN)

By C. H. D. CLARKE

THE HOARDING activities of squirrels and their supposed forethought are manifestations frequently commented on and generally familiar. In spite of this they offer an unlimited field for original observation and report. How many of us are able to answer the questions which arise in our minds about the squirrel activities which we can see from our own windows?

Employment in September, 1931, in charge of a small cone-picking squad of the reforestration section of the Ontario Forestry Branch gave me an opportunity to make some observations which are here set forth. The maintenance of a forest tree nursery necessitates a constant and reliable supply of tree seed, which has to be gathered almost entirely from natural stands. It is desirable to have a collection from each year's crop. Because of its good sylvicultural characteristics and freedom from disease red pine (*Pinus resinosa*) is in great demand, and we spent the first half of September at Sable Beach, and the last half at Point Clark, both in Bruce county, Ontario, picking cones from the red pines which grow along the shore of Lake Huron in these localities.

The red pine has a more or less diffuse top like other pines and unlike the spruces and balsams. The cones grow at the ends of the branches in twos and threes rather than all in one cluster. According to counts by the Ontario Forestry Branch it takes 1644 red pine cones to fill a bushel measure. About the first of September the green cones take on a reddish hue and are ripe enough to pick It is necessary to climb the tree and pick them one by one. The 1931 season was poor, many trees were not bearing well and many cones were wormy.

When we started to pick at Sable Beach we noticed that the red squirrels were also picking, cutting off single red pine cones and carrying them, one at a time, to adjoining cedars, where they were placed in branch forks and in crotches. Many cones were cleaned and the seeds eaten. Arboreal caching of cones continued through our stay at Sable Beach, but was not observed later in the month at Point Clark.

When we moved our camp to Point Clark we pitched right in the shade of a large red pine, which was of course the first tree to receive the attention of our pickers. As in most cases, there were more cones left on than we were able to pick, and seeing a squirrel busily reaping where we could not reach determined us to investigate his activities, if possible to our own profit. It was found that unlike the squirrels observed at Sable Beach those at Point Clark carried each cone to the ground and tucked it into the top layer of needle litter near some object, such as a stump, tree, log, etc. There was no concealment of any importance. From a standing position not many cones could be seen, but on hands and knees all were visible, the butt ends of the cones showing above the litter. Many

cones were flat on the ground where there happened to be no litter. The exposed top of a stump was a common site for cones to be placed by squirrels, and a prostrate log often had cones neatly placed along the top. The cones were placed in twos and threes or singly. Five was a large number to find in one spot. Juniper clumps were perhaps more favoured than other sites when available, and cones were placed around the outside rather than in the middle of the clump. Early in our squirrel investigations much time was wasted feeling into hollows and under stumps, until we learned that cones simply were not placed in such places. I have known of large hoards but have never seen a large hoard of red pine cones. Possibly they may be made later in the month when squirrels sometimes drop large numbers of red pine cones to the ground without themselves descending. This was observed at Point Clark late in the season when the cones were beginning to open on the trees. I was never able to observe the disposal of such accumulations.

In prowling around on hands and knees one was soon aware that the squirrels were not depositing cones all over the bush. Each squirrel had his own area and by getting to know a squirrel territory one could get to know the daily pick which was determined in one instance. One squirrel at least picked about 1000 cones in one day (over half a bushel), each cone representing a trip up a pine tree and down again, or about one trip per three-quarters of a minute throughout a busy 12-hour day, and around 35 miles of distance traversed, much of it vertical.

Squirrels were found to pick cones neatly, taking open cones only if they contained seed and wormy cones only if part of the cone was sound. They did not strip one tree and then proceed to the next; on the contrary successive trips were often to different trees. So far as could be seen no tree was picked clean.

All of the cones picked by our squad were spread out to dry on a large sheet of burlap, and I watched this enormous accumulation carefully to see if the squirrels would find it. Actually only one squirrel visited it, a further demonstration of territoriality His excited behaviour on the discovery of so much wealth was very amusing. He immediately ceased to pay any attention to cones in trees unless prevented by camp activity from attending to those on the ground. Camp activity was such that he actually had only a short time each day in which he was undisturbed. He had only one route to the drying sheet, from the nearest juniper clump. On one occasion the camp cook took a nap in the sun directly across this route. After reconnoitering from a nearby tree the squirrel actually jumped over the cook, got a cone, and returned the same way to his juniper shelter. This so excited him that he had to climb into a tree and chatter, whereupon the cook awoke and went back to work.

Our picking usually left a stem of one-quarter of an inch to one inch on each cone. On picking up a cone from the drying sheet the squirrel immediately nipped off this stem. The neat pile of stems left always showed how many cones had been taken in our absence, and I was always able to recover all of them in the juniper clump. These stolen cones were tucked out of sight. Furthermore, the squirrel seemed to miss those which I recovered, since he started burying cones six inches underground but still in the same clump

Except that cones were placed beside natural objects in a small radius there was no apparent order in hoarding. I doubt if one cone in a hundred is ever recovered by the squirrel. One could often find two or three of this year's cones with two or three of last year's below them, and those of other years further down in series until the cones became part of the humus. No seeds from such cones could ever germinate, since the moist green cones soon heat and kill their seeds, or at least never open.

According to experienced cone-pickers squirrels are fonder of red pine cones than of those of other conifers. When we ceased working the only other available species, cedar, was just ripening,but it was evident from old caches that cedar cones were stored by squirrels. I was informed that hemlock cones are very difficult for human pickers to gather, and that squirrel caches are depended on for the small supply needed.

It is obvious that by marking cones a number of experiments could be carried out, and interesting results in information on squirrel behaviour confidently expected.

HIGHWAY TRAFFIC TOLL

By G. C. TONER

IT IS BECOMING increasingly evident that modern highways are death traps for small animals. For the past two years a record has been kept of each dead animal noted on No. 2 Highway between Gananoque and Kingston. This portion of the highway has a length of eighteen miles. At least once a week the distance between the two

1937

	April		May		June		July		August		September		October
10	1 crow	1	2 cottontails	16	1 skunk	5	1 snapping turtle			9	5 skunks	15	1 skunk
	2 cottontails	4	2 cottontails		1 cottontail						1 cottontail		
	1 cat	9	2 cottontails			21	1 goldfinch			18	3 skunks		
12	1 cottontail	31	1 cottontail				1 woodchuck			24	1 house sparrow		
15	2 cottontails		2 wood-chucks			24	1 milk snake				2 garter snakes		
25	1 garter snake		1 robin										
28	1 cottontail		1 kingbird								1 skunk		
										30	3 skunks		
											1 song sparrow		

1938

	April		May		June		July		August		September		October
13	2 cotton-tails	1	2 snapping turtles	3	1 cat	11	2 skunks	1	2 skunks	1	3 skunks	2	5 skunks
			1 woodchuck		1 painted turtle		1 cat		1 cat	8	1 black squirrel		2 black squirrels
		9	1 woodchuck	21	1 woodchuck	16	1 black squirrel		1Blanding's turtle		1 cat		1 chipmunk
			1 cottontail		1 skunk		1 chipmunk	9	1 cottontail	14	over 100 *	20	1 porcupine
		18	1 woodchuck		1 black squirrel		2 skunks		3 skunks		tree swallows		3 skunks
			1 snapping turtle	27	1 barn swallow		1 robin		1 goldfinch	15	1 black squirrel		1 black squirrel
		19	1 red squirrel		1 skunk	23	2 skunks				1 skunk		1 red squirrel
			2 skunks		1 least bittern						1 crow		
		25	1 goldfinch										

* For details see *The Auk* (in press)

points has been covered, and as the carcasses of most creatures will remain for several days even in hot weather, it is believed that few have been missed. In the table given below is the full list of creatures killed on this portion of the road.

The figures shown suggest a means of comparing populations from year to year. These given are, of course, too few for any significant data to be drawn from them, but it is interesting to note the changes in the numbers of two mammals that observations in other ways have verified. Cottontails, *Sylvilagus floridanus mearnsi*, reached a peak early in 1937 and have been very scarce since the fall of the same year. Black squirrels, *Sciurus carolinensis leucotis* were at a peak in the late summer of 1938 and may increase still more in 1939. The trend in numbers is suggested in the table.

The author would suggest that naturalists, who are familar with our small animals, keep a record of all noted on some portion of highway over which they travel each week. If such records were available from several regions over a number ot years population studies would have much valuable corroborative data.

It may interest the morbid-minded to know that three people were killed on the same stretch of highway during the period it was under observation, one in 1937 and two in 1938. These are not included in the table.

APPARENT NESTING OF THE PIGEON HAWK (Falco columbarius) IN THE CITY OF OTTAWA

By HARRISON F. LEWIS and RONALD W. SMITH

ON THE MORNING of May 3, 1936, the senior author, who has become familiar with the cries of Pigeon Hawks in the nesting season on the north shore of the Gulf of St. Lawrence, heard with surprise, through an open window of his residence in the southern part of the City of Ottawa, the scolding cry of this species, frequently repeated. Investigation, which was made within a few minutes, resulted in finding two Pigeon Hawks in the park area beside Echo Drive and the Rideau Canal, just north of the north end of Grosvenor Avenue, where there are a number of large white pine trees and American elms

On the morning of May 4th, some time was spent in watching these birds in the same area in which they had been found on the previous day. They were clearly seen through X8 binoculars, both perched and flying, at distances ranging from 100 to 200 feet, and their cry was frequently heard. The larger size of the female as compared with her mate, was readily apparent. The birds were identified as Pigeon Hawks on the evidence of their cry, their size, their characteristic falcon shape, their streaked underparts, the clear dark bluish back of the male and the brownish back of the female, and the four light-coloured cross-bars on the tail of each bird. Both birds showed interest, on this date, in a nest, apparently an old Crow's nest, situated close to the trunk of a white pine tree, at a height of 50 to 60 feet above the ground. The male was seen to visit this nest at least three times. On the occasion of the last of these visits, he remained on the nest for some time and appeared to be engaged in some activity there Both birds in turn perched at a height of about 75 feet on a bare limb of a dead white pine about 30 yards from the tree containing the nest. This perch proved to be a great favourite with them and, as they seemed to pay little attention to vehicles or persons passing their vicinity, excellent views of them in this exposed position were easily obtained.

One or both Pigeon Hawks were seen in the vicinity of the nest by the senior author on May 5, 6, 7, 10, 14, and 17. On the last-mentioned date, a fine, warm, sunny day, a visit was made to the vicinity of the nest about 1.00 p.m. At first all was quiet and no Pigeon Hawk was seen. Suddenly a Pigeon Hawk, apparently the male, flew from a northerly direction straight to the nest. Once there it repeated a short note, "Ick! Ick! Ick!", etc., for several minutes, possibly as a protest against the observer's presence. Soon the other Pigeon Hawk appeared in flight from the north, giving its shrill chattering cry as it came, and flew directly to the perch on the limb of a dead pine, where it continued to utter its chattering cry at frequent intervals. Three or four minutes later this bird flew to a perch about one foot from the nest, on which the first Pigeon Hawk still was. After a few minutes, during which both birds cried much, they both flew away northward.

The nest and its vicinity were visited frequently by the junior author from May 24th to June 15th and one of the Pigeon Hawks was seen almost

every day on the usual perch on a dead tree. It could often be found in this position about 8.30 a.m., and on June 2nd it was seen in the same place at 6.00 p.m. The junior author found that his visits to the vicinity of the nest usually caused no demonstration on the part of the Hawks. The only exception occurred at about 6.00 a.m. on May 27th, when one of the Pigeon Hawks squealed and cried in protest when he approached the tree in which the nest was situated.

During frequent field trips in the region within a mile of the nest, which included open fields, wooded areas, Dow's Lake, and parts of the Rideau River and Rideau Canal, as well as residential blocks in the city, the junior author was on the alert for any sight of these Pigeon Hawks, but on only two occasions did he see what he believed to be a bird of this pair away from the immediate vicinity of their nest. A Pigeon Hawk was seen flying rapidly southward over the grounds at 45 Leonard Avenue on May 28th. At 7.30 p.m. on June 1st, an adult Pigeon Hawk was seen flying low over the same residential property, going toward the nest, and carrying in its talons what appeared to be a Virginia Rail (*Rallus limicola*).

On the ground beneath the dead pine in which these Pigeon Hawks were accustomed to perch, the bird remains listed below were found during the period of their tenancy.

One Tree Swallow (*Iridoprocne bicolor*), beheaded.

One Chimney Swift (*Chaetura pelagica*), beheaded.

One wing of another Chimney Swift.

One wing of a male Bobolink (*Dolichonyx oryzivorus*).

A few feathers of a male Slate-coloured Junco (*Junco hyemalis*).

The senior author left Ottawa for the summer on May 19th, the junior author on June 15th. As far as is known, no one, unfortunately, climbed at any time to the nest frequented by these Pigeon Hawks, to ascertain if there were eggs or young Hawks in it. It appears, however, very probable that this pair of Pigeon Hawks, in 1936, used this old nest for their nesting. They have not been seen in that vicinity in 1937 or in 1938.

There is no other known record indicating breeding of the Pigeon Hawk at Ottawa or in its immediate vicinity. The nearest place at which this species has been known to nest is Low, Quebec, 35 miles north of Ottawa. Mr. P. A. Taverner has an unpublished record that indicates nesting of the Pigeon Hawk at Low in 1933.

REVIEWS

ROYAL ONTARIO MUSEUM OF ZOOLOGY. BULLETIN NO. 8, *Toronto November, 1938. p.p. 16.* Contains an account of museum accessions and activities from October 1, 1937, to September 30, 1938, and a valuable six page discussion of animal fluctuations.—C.H.D.C.

THE NATURALIST'S DIRECTORY.—This handy reference, of which the 1938 edition has just been published contains the names, addresses and special subjects of study of professional and amateur naturalists in North and South America and other countries. Naturalists may have their names listed in the Directory free of charge. Copies of the Directory may be obtained for $3.00 each postpaid; address The Naturalist's Directory, Salem, Mass.

21ST ANNUAL REPORT OF THE PROVINCE OF QUEBEC SOCIETY FOR THE PROTECTION OF BIRDS, INC.—The report for the year ending May 31, 1938, gives a full account of the activities of the Society for 1937-38 In addition the most important bird records of the year are listed. With the report was received a Field Checking Card for birds of the Montreal region.—C.H.D.C.

ERRATA—In Number 2 of this volume (February 1939) the following errata should be noted.

Page 24, title, *Schistoeerca* should be *Schistocerca.*

Page 28, column 1, line 17, after *Downy Woodpecker* put *1.*

Page 29, column 2, lines 38 and 39, *Birringing* should be *Bird-ringing.*

Page 30, column 2, line 44, *change* should be *changes.*

Page 30. column 2, line 48, *specimans* should be *specimens.*

Affiliated Societies

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1937-38

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THE CANADIAN FIELD-NATURALIST

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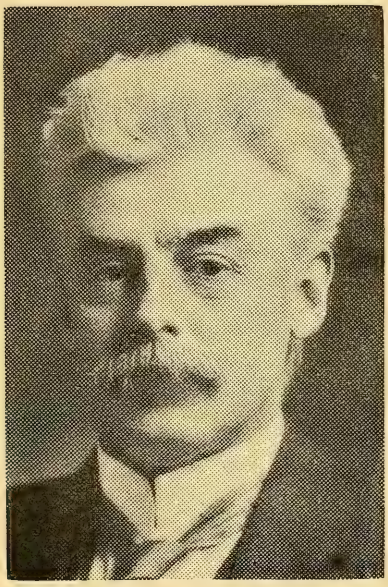
VOL. LIII OTTAWA, CANADA, APRIL, 1939 No. 4

MARK G. McELHINNEY

1867 - 1938



Mark G. McElhinney

THE MEADOW LARK

'Mongst all the little choristers
Of hill and plain and dale,
I love the little meadow lark
Who cheers the prairie trail.

Up from the sod where bluebells nod
And the blood lilies flame,
He seeks the nearest perch to trill
His welcoming acclaim.

He fain would burst his little throat
To tell his joy to me,
For life for him from dawn to dark
Seems one sweet ecstasy.

Morning in the Marsh.

In the death of Mark G McElhinney, which occurred at Ottawa in October, 1938, the Ottawa Field-Naturalists' Club lost not only a valued member of its Council but one who had for many years been a keen student of nature with a great love for the out-of-doors. I knew him first over 35 years ago, having been introduced to him by the late Dr. James Fletcher, soon after I came to Ottawa to join the Dominion Entomological Service. A few years later I got to know him better while residing during the summer months at Britannia on Lake Deschenes, at which place he also lived.

Mark McElhinney met his death in the waters of Dow's Lake, near the Central Experimental Farm, Ottawa, the body being found in about five feet of water near the house-boat *Summertime*, on which he lived with his brother, Dr. George McElhinney. At the time of his death he was 71 years of age. He was always fond of boats; and undoubtedly his greatest pleasures were those experienced while travelling over water in a boat the engine of which had been built, improved, or made over by him.

In an interesting letter dated February 26, 1938, which he addressed to Douglas Leechman of the National Museum of Canada, he stated that when less than a year old he was taken on board the barque *Avondale* which made voyages to various European ports. When about four years old, his father "took over the ship known as the *City of Halifax*" which plied between Halifax and Liverpool. His memory of this voyage was very pleasant, as also the time he spent in Liverpool. Thus, in early life he developed a love for the water. From the above letter the following quotation is taken: "You may have noticed that we had a storm last night and even now (one p.m.) it is blowing hard. In a house in town it would not mean anything out of the way but we had everything for the setting of a ship frozen in, in the Arctic, except the danger. Howling wind, driving snow, rattling rigging and the drumming of the deck tent in which is stowed summer equipment. I enjoyed it immensely especially as we were warm and comfortable on board."

Mark McElhinney was born in Truro, N. S. on July 19, 1867, but most of his life was spent in Ottawa. After attending public school and the Lisgar Collegiate Institute he entered the University of Toronto Dental College and following graduation set up a practice in Ottawa, which he continued until his untimely death. For years members of my family received professional assistance from him. Always he had a fund of interesting talk which directed attention away from the operation in hand. At one time, he was president of the Eastern Ontario Dental Association. He also served in the same capacity, in 1915, with the Ottawa Dental Society.

In the early days of the motor car in Ottawa Mark McElhinney took a keen interest in this mode of transportation and was in fact one of the original founders of the Ottawa Automobile Association and president in 1929. Anything in the way of machinery attracted his attention. He spent many happy hours in a well-equipped machine laboratory which he, himself, developed.

One other hobby he had was that of writing poetry. In 1927 he published a book of poems under the general title of *Morning in the Marsh*. The volume was dedicated to his son, "who fell in France." These poems, "redolent with the tang of the outdoors", indicated a very wide interest. They were read with pleasure by many of his friends as well as others who had not the pleasure of his acquaintance.

He was a kindly man. Those who knew him will miss his cheery disposition. The Field-Naturalists' Club, in which of late years he took a keen interest, will no longer receive help from him, but the service he rendered will be remembered for many a day by his fellow councillors. —ARTHUR GIBSON.

*NYMPHAEA TETRAGONA GEORGI IN CANADA**

By A. E. PORSILD

ONE OF our rarest Canadian plants is the diminutive waterlily *Nymphaea tetragona* which, in North America as elsewhere, has a rather peculiar and disrupted range being known from but 14 stations, from Eastern Quebec, south to Rhode Island, west to Great Slave Lake and Northern British Columbia and south to Idaho. Of the 11 Canadian stations known to the writer, 9 are north and west of Lake Superior, near the edge of the Laurentian shield with one station on nearby Isle Royale, Michigan.

Because of its small size *Nymphaea tetragona* lends itself well to cultivation and is very suitable for fish ponds or even for small aquaria. It is widely cultivated in China and Japan where the seed and the unopened flower buds are eaten when pickled.

Superficially *Nymphaea tetragona* resembles the slightly larger flowered *N. odorata* var. *minor*, a variety of the scented white waterlily. Because in the past *N. tetragona* has been confused

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with it the principal distinguishing characters are given below:

Nymphaea tetragona

floating leaves: oval-oblong in outline, always longer than wide (average 5 cm. wide and 7 cm. long), the sinus rather open, extending beyond the centre of the leaf; the lobes narrow, with tips forming an angle of less than 60 degrees; underside of floating leaves dark green, seldom greenish red, with the veins sunk into the leaf tissue.
flowers: small, 3 to 5 cm. rarely 8 cm. in diameter.
pollen grains: smooth or obscurely warty under low magnification (x 40), 0.04—0.05 mm. in diameter.

N. odorata var. minor

floating leaves: orbicular in outline, the sinus narrow, extending to centre of leaf only; the tip of the lobes forming an angle of more than 60 degrees; underside of floating leaves dark reddish-brown with veins appearing as elevated ridges.
flowers: larger, 5—9 cm. in diameter.
pollen grains: distinctly tuberculate, 0.03 to 0.035 mm. in diameter.

The first to collect *Nymphaea tetragona* in North America appears to be Robert Bell of the Geological Survey of Canada who, in 1879, took it in Missinaibi River in the basin of Moose River, of Northwestern Ontario. His specimens, by John Macoun (in herb.) were first named *Nymphaea odorata* var. *minor*. Lawson (1888), although he proposed the new combination *Castalia tetragona*, did not recognize North American specimens of this plant, and, likewise, erroneously referred Bell's specimens from "Mirraibi R." to *C. odorata* var. *minor*. In the same year Thomas Morong (1888) described a new waterlily from Idaho, stating that his *Castalia Leibergi* resembled *C. pygmaea* Salisb. from Siberia. Two years later Macoun (1890), on the authority of N. L. Britton, corrected his former mistake placing Bell's plant under *Nymphaea tetragona*. Britton and Brown (1897) relegated *C. Leibergi* Morong to synonymy and, at the same time, gave a somewhat better illustration (l.c. fig. 1844 of the 1913 ed.) than Morong's (l.c. tab. 7).

The question as to whether the American plant differs from that of the Old World has been raised from time to time, but, owing to scarcity of material has not been finally settled. Conard (1905) in his monumental monograph of the waterlilies under *Nymphaea tetragona* suggests that "The American plant, from its small number of stamens and their insertion below the summit of the torus, may deserve the rank of variety". Conard, however, had seen very little American material and his very detailed description of *N. tetragona* is obviously drawn partly from American and partly from Old World material. His fig. 65, showing floral details may have been drawn from American specimens whereas his plate (tab. 14) is most decidedly not that of an American plant.

Cockerell (1908), on the strength of Conard's remark cited above, for the American plant proposed the combination *Castalia tetragona* var. *leibergii* (Morong), but apparently failed to look up Morong's (1888) description of *C. Leibergi* where it is definitely stated that: "sepals an inch long, narrowly obtuse—petals in two rows, a little shorter and more obtuse than the sepals—leaves oblong or oval, with broad open sinus and obtuse lobes—". In his discussion Morong further states that his plant "bears much resemblance to *Castalia pygmaea* Salisb., a plant found in Siberia, China and Japan, but that has still smaller flowers, with acute sepals and petals—"

With the more abundant material now available it seems clear that the American plant differs from that of the Old World, chiefly by its consistently oblanceolate-obtuse petals, its somewhat less acute sepals and its more open, straight sided leaf sinus. The number of stamens on the other hand does not appear to offer any constant difference for in flowers from six different Canadian stations the number of stamens vary from 20 to 40. Rydberg (1917 and 1932) upholds Morong's name, stating that the number of stamens is between 20 and 30 and at the same time he amends Morong's description of the leaves, saying "basal lobes acute".

In *Nymphaea tetragona* of the Old World the petals are very definitely acute; the sinus is narrower with rounded, mostly overlapping sides. Ledebour (1842) thus says, in part: "*lobis subapproximatis angulo interno rotundatis—petalis acutis*". The most recent description and illustration of the Old World plant is that in Fl. U.R.S.S. (1937) where the well drawn plate shows a plant with lanceolate, definitely acute petals.

The American plant then seems best treated as a geographical race of *Nymphaea tetragona* for which the following combination is proposed:

Nymphaea tetragona Georgi Bem. Reise in Russ. Reich. 1:220 (1775). *N. pygmaea* Ait. in Hort. Kew. 2nd. ed. 3:293 (1811).

subsp. **Leibergi** (Morong) **comb. nov.**; *Castalia Leibergi* Morong, Bot. Gaz. 13:124 (1888); *Nymphaea tetragona* Macoun, Cat. Can. Pl. 5:300 (1890) not Georgi; Conard, Carnegie Inst. Publ. 4:167-170 (1905) as to American plant only, excl tab. 14; *Castalia tetragona leibergii* Cockerell, Muhlenbergia 3:145 (1908); *C. odorata* var. *minor* Lawson, Trans. Roy. Soc. Can. 6,4:113 (1888) not Sims, *saltem pro maxime parte.*

The writer has seen the following specimens of *N. tetragona* ssp. *Leibergi:*

QUEBEC: Rimouski, Rimouski County, *C. A. Boardman,* 1899 (US)[1]. RHODE ISLAND: Newport, *E. A. Mearns* (G); NORTHWESTERN ONTARIO: Missinaibi River, *Robert Bell,* No. 1417 (CAN); Basin of Moose River, *J. M. Bell,* 1903 (G); Lake Nipigon, Gull Bay, *Wm. McInnes,* No. 5538 (CAN, G and US); Loon Lake Siding, C. P. Ry. east of Port Arthur, *idem,* No. 3076 (CAN and G); Root River, Lake Seul, *Fawcett,* No. 10.280 (CAN); Minnitaki Lake (south of Lake Seul and west of Sturgeon Lake) *Wm. McInnes,* No. 18.914 (CAN); Deer Lake, Rainy River district, *idem,* No. 18.257 (CAN); in ponds along Severn River, *J. M. Macoun,* No. 1418 (CAN); NORTHWEST TERRITORIES: Great Slave Lake, on an island of the Simpson group, 40 mi. northeast of Resolution, *E. A. Preble,* No. 243 (US); MICHIGAN: Isle Royale, *W. S. Cooper,* No. 131 (G); IDAHO: ponds, Granite Station, Kootenai County, *J. H. Sandberg,* No. 812 (G); Kootanai Co., *J. B. Leiberg,* July 12, 1890 (CAN); BRITISH COLUMBIA: Prince George district, Aleza, *B. G Griffith,* No. 8868 (CAN).

In addition there are in the National Herbarium of Canada two sheets of *Nymphaea tetragona,* in J. M. Macoun's handwriting labelled as having been "cultivated at Toronto by J H. Fleming, 1894". In a letter dated June 7th., 1937, Mr. Fleming writes as follows: "I bought a plant of what was then known as *Nymphaea pygmaea,* said to have originated from Chinese sources, from Henry A. Dreer of Philadelphia, it grew freely in my tank, flowered and evidently seeded, and I had it for some years."

Specimens of *N. tetragona* ssp. *Leibergi* in the National Herbarium of Canada differ from the Chinese plant cultivated by Mr. Fleming and from a sheet from Finland: Pl. Finlandiae Exsicc. No. 1171, as stated above by the shape of the petals and by the sinus of the leaf.

The distribution of *Nymphaea tetragona* outside of North America, according to Conard (1905), Hultén (1928) and Fl. U.R.S.S. (1937) is as follows: EUROPE: Finland and Russian Karelia and Petchora R.; ASIA: northwestern Siberia to Kamtchatka, south to Lake Baikal, Sakhalin, China, Japan and Kahsia Mts. of India; AUSTRALIA: N. Queensland (?)

[1] US—United States National Herbarium, Washington, D.C.
G—Gray Herbarium, Harvard University, Cambridge, Mass.
CAN—National Herbarium of Canada, Ottawa.

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*NOTES ON SEPTEMBER BIRDS ALONG ONTARIO'S SEA-COAST**

By HARRISON F. LEWIS

THE TIDES of the sea rise and fall every day along six hundred and thirty miles of low, swampy, marsh-fringed shore of the Province of Ontario, extending along Hudson Bay from the Manitoba-Ontario boundary southeastward to Cape Henrietta Maria, thence southerly along the west and southwest sides of James and Hannah Bays to the mouth of the Harricanaw River, thence northerly along the east side of Hannah and James Bays to Gull Bay, where the boundary between Ontario and Quebec comes out to the coast The notes here

* Presented at the Convention of the Federation of Ontario Naturalists, Toronto, Ontario, January 28, 1939.

presented relate to observations made during a short visit, from September 18th to 25th, 1938, to the small southern part of that tidal region, between Moosonee, on the estuary of the Moose River, and East Point, at the northeast extremity of Hannah Bay.

James Bay, which is about 230 miles long and 140 miles wide, occupies the lowest part of a shallow depression with sides that are very flat and slope very gently. The bed rock, which is of Devonian limestone on the south, of Devonian and Silurian limestone on the west, and of Archaean rock on the east, is covered in most places by glacial debris of boulders, sand, and clay, rearranged by marine action and by rivers. Although the tide rises and falls vertically only 5 to 7 feet, the southern and western shores are so nearly horizontal that in the course of this rise and fall the waters of the bay advance and recede over flats of fairly firm material that are often from two to four miles in width. Owing to the extreme muddiness of the water, to wave action, and perhaps to the reduction of salinity by the inflow of fresh water from a large drainage area, there is very little vegetation on these flats. Above normal high-tide mark, on the south and west shores of the bay, is a border of sedge-grown marsh, usually about a mile wide, with fresh to brackish water. In exceptionally high tides the bay overflows this marsh for short periods. Back of the marsh are woods, first a profusion of willows, then white spruce and poplar, often 75 or more feet high, then black spruce and tamarack.

In the course of a short walk about Moosonee before breakfast on the morning of September 18th, fifteen species of birds were observed. Of special interest was the fact that at that time a marked southward movement of Palm Warblers (*Dendroica palmarum*) and Hudsonian Chickadees (*Penthestes hudsonicus*) was taking place. Representatives of these species were passing southward almost continuously by short flights from tree to tree and from thicket to thicket in the strip of partly-cleared land within three hundred yards of the west bank of the Moose River. The wind, at the time, was a fresh gale from the southeast, which may have had a definite relation to this movement.

We usually think of the Hudsonian Chickadee as being, in the main, non-migratory, because we seldom see Chickadees of this kind south of the breeding range of the species. It is, however, quite possible, and is suggested by the observation just related, that many, if not all, of the Hudsonian Chickadees that nest in the northern part of the range of this species may migrate more or less regularly in autumn into the more southern part of the specific breeding-range, without usually passing its limits, and may return northward in spring. On the other hand, the movements of Hudsonian Chickadees that I observed near James Bay may have been merely local wanderings.

Four Black-capped Chickadees (*Penthestes atricapillus*) were also observed at Moosonee on the morning of September 18th, but I noted no indication that they were participating in the southward movement of their congeners.

While crossing Hannah Bay, the southernmost arm of James Bay, on the morning of September 19th, in the Hudson's Bay Company's motor sloop *Dorothy*, I was much interested to observe the actual loss of a small bird at sea. The day was dark and cloudy, with light rain, a gentle east wind, and a small swell on the surface of the water. Few birds were to be seen, but suddenly a sparrow-like bird, almost certainly an adult male Lapland Longspur (*Calcarius lapponicus*), appeared and flew about the boat, which was traveling southeast at about eight miles an hour, with the breeze on the port bow. The bird alighted for a moment on the boat, but, apparently frightened by the presence of several persons on deck, took flight again almost immediately, circled around, and, overtaking us, approached the stern. When it was close to the boat, it descended to a position within a foot or two of the water, back of the stern and below the level of the deck. Perhaps it was seeking shelter in the lee of the stern, which was of a square type. There may have been a downdraft just behind the boat but in any event the bird had been close below and behind the stern for only a few seconds when in some way it dropped into the water. It either remained on the surface or rose to it at once. Until it passed from sight astern it rested on the surface of the water, as though dazed, making no evident effort to rise into the air.

Much of the afternoon of September 19th I spent in tramping over broad marshes and tidal flats bordering the mainland near the mouth of the Harricanaw River. In a region as unfamiliar as that about James Bay, all observations of birds are interesting to the ornithologist and so I took much pleasure that afternoon in noting twenty-two species of birds, although most of them were of kinds that we usually call common. Shore birds, of which I recorded nine species, were particularly prominent. Pectoral Sandpipers (*Pisobia melanotos*), of which I saw about

fifty, scattered along the border of the marsh, were conspicuous, as were also a flock of more than two hundred Semipalmated Sandpipers (*Ereunetes pusillus*), contentedly chippering as they sought food on the mud-flats. A few Black-bellied Plover (*Squatarola squatarola*) and Golden Plover (*Pluvialis dominica*), about five of each species, flew here and there. In the marsh itself, scattered and solitary, were a number of Wilson's Snipe (*Capella delicata*), of which I flushed seven.

Although the height of the southward migration of Blue Geese (*Chen caerulescens*) had not yet reached southern James Bay, the species was well represented in favoured places in that region and I saw about seven hundred at the mouth of the Harricanaw on the afternoon of the 19th. Sixteen Lesser Snow Geese (*Chen hyperborea hyperborea*) and one Canada Goose (*Branta canadensis* were also seen during the same half-day.

While I was walking across the higher part of the marsh, among scattered willows, observing Savannah Sparrows (*Passerculus sandwichensis*), Swamp Sparrows (*Melospiza georgiana*), and Tree Sparrows (*Spizella arborea*), two other Sparrows, strange to me, flew from the sedges to a small, solitary willow. There I studied them at leisure through a X6 binocular. They were exceptionally handsome little birds, with gold-tinged breasts and golden stripes on their heads, and, as I had good views of them, I thought I knew what they were, but, after examining many specimens in the National Museum of Canada, I find that the question is more difficult than I had realized and I remain quite uncertain whether they were Nelson's Sparrows (*Ammospiza caudacuta nelsoni*) or Leconte's Sparrows (*Passerherbulus caudacutus*). I need much more field experience with these birds.

My most interesting observation on the 20th, a cold, gray day, with a high northwest wind, was made in the interior of Hay Island, which is a swampy, alluvial island that divides the mouth of the Harricanaw into two parts. Much of it is covered with a somewhat open growth of mature willows, twelve to twenty feet high. Among these I came upon two adult Canada Jays (*Perisoreus canadensis*), one of which was seen to fly to a wasp's nest, in an old willow, at a height of about four feet from the ground, and feed there, apparently picking wasps, or their larvae or pupae, from the interior of the nest. No wasps were flying about, the temperature being probably too low for them to be active.

On the morning of September 21st we moved out of the Harricanaw into the open bay and proceeded northward to an anchorage between East Point and the low, marshy peninsula known as Plover Shoals, now included in Hannah Bay Waterfowl Sanctuary, which was recently established by the Province of Ontario for the benefit of Blue Geese and other waterfowl. During this voyage, three White-winged Scoters (*Melanitta deglandi*) in one group were identified on the open bay, and two distant flocks of ducks, one containing about 12 birds, the other about 25, were thought to be of the same species. At Plover Shoals, where there were very large feeding-grounds well suited to geese and to dabbling ducks, Pintails (*Dafila acuta*), Black Ducks (*Anas rubripes*), and Green-winged Teal (*Nettion carolinense*) were common. The only additional species of duck that I recorded with certainty during this visit to James Bay is the Baldpate (*Mareca americana*). I did not see it there in life, but saw one that was taken by one of our party at the mouth of the Harricanaw River on September 20th.

Blue Geese, which had been present in hundreds at the mouth of the Harricanaw, were to be found on Plover Shoals in thousands. A few Lesser Snow Geese, as usual, were mingled in their flocks. One flock that flew over me at close range on September 22nd contained 12 Blue Geese, one Lesser Snow Goose, and one goose that was apparently a hybrid between these two species, for it had wings resembling those of a Blue Goose, but its underparts were white except for a narrow collar of dark colour across its upper breast, just below its neck, and its rump and upper tail-coverts also appeared white. The almost complete absence of young among the flocks of Blue Geese that we saw was very noticeable and probably indicated that the reproduction of this species in 1938 was, for some reason, not very successful. Canada Geese were fairly common in the vicinity of Plover Shoals and East Point.

As might be expected from the name of the place, Plover Shoals peninsula was much frequented by shore birds. The most numerous species present was not, however, a true Plover, but the Red-backed Sandpiper (*Pelidna alpina*). About two thousand of this species were observed busily feeding on pebbly, boulder-strewn tidal flats on September 21st and 22nd. Other shore-birds observed on Plover Shoals, although in small numbers, were the Semipalmated Plover (*Charadrius semipalmatus*), Black-bellied Plover, White-rumped Sandpiper (*Pisobia fuscicollis*), Pectoral Sandpiper, Semipalmated Sandpiper,

Knot (*Calidris canutus*), Sanderling (*Crocethia alba*), Greater Yellow-legs (*Totanus melanoleucus*), and Ruddy Turnstone (*Arenaria interpres*).

While I was observing some of these shore-birds, on September 21st, on those vast, marshy, tide-drenched shoals, I was startled to hear a bird-call that was undoubtedly familiar but that seemed so out of place in such surroundings that for a moment I could not realize what it was. Swinging around, I found myself facing a very lively-looking Flicker (*Colaptes auratus*), which was standing near me on bare ground, where it repeatedly bobbed its head and uttered its clear *whee-you*! A feather in one wing was plainly awry and the bird could fly only a short distance. Probably it had been injured by shot or by some bird of prey while it was migrating over Plover Shoals.

September 22nd was a fine, sunny day, with a cool, light north wind. Along the shore of the mainland near East Point, flock after flock of Horned Larks (*Otocoris alpestris*) and Lapland Longspurs was seen flying northward. In the fringe of woodland behind the marsh I found groups of Hudsonian Chickadees, whose movements through the tree-tops appeared to trend in the same direction.

On September 23rd we travelled back as far as Shipsands Island, in the mouth of the Moose River, where I saw fifteen Golden Plover, the largest number of this species that I saw on any one day during the trip

At Moosonee, on September 25th, another before-breakfast walk resulted in the usual pleasant assortment of observations of personal interest. Again a very noticeable southward movement of Hudsonian Chickadees was taking place along the west side of the Moose River. It was not, on this date, accompanied by a similar movement of Palm Warblers, but it was quite overshadowed in size and conspicuousness by a southward migration of Redpolls (*Acanthis linaria*). Between 7.15 a.m. and 8.30 a.m. I recorded 241 Redpolls, which, in flocks containing from 5 to 60 birds each, were flying steadily and uniformly southward at a height of from 30 to 50 feet. No Redpolls were seen to alight during this period. The morning was fine and clear, with hoar-frost on plank walks, although potato-plants in garden plots appeared to be uninjured. There was a light southerly wind.

VOLE PLAGUE AT SMOKY FALLS, ONTARIO

By R. V. WHELAN

NOW THAT the *Microtus* plague of 1937-1938 has passed, this small creature is conspicuously absent from the Smoky Falls region. The writer feels that the few notes made during its abundance in this northern section of Ontario may be of interest.

Smoky Falls is a small village located on the west shore of the Mattagami River, fifty miles north of Kapuskasing and about one hundred miles south of James Bay. The animal concerned is the so-called Meadow Vole, *Microtus pennsylvanicus* (Ord).

Our first record in connection with *Microtus* is dated July 27th, 1937, but we agree with Professor Coventry of the University of Toronto who visited Smoky Falls during September 1937, and was of the opinion that *Microtus* numbers were swinging upwards during 1936. Records of 1936 show that during the summer of that year *Microtus* were more abundant than previous years but that these voles had not invaded the townsite to an extent that would excite comment. It was not until the summer of 1937 that their numbers assumed the proportions of a plague. By August 1937 *Microtus* were so numerous that even the least observant residents were asking where all the mice came from.

During the first week of September we noticed that hawks were abnormally common. Marsh and Rough-legged Hawks, *Circus hudsonius* and *Buteo lagopus*, were positively identified. On November 5th, 1937, we watched a Rough-legged Hawk dive four times during the day from a power line cross-arm to take some small prey, presumably *Microtus*, making the snow swirl as it captured it. Up to the end of November a Snowy Owl, *Nyctea nyctea*, spent the entire day in the center of the townsite sitting on such objects as housetops, playground swings, hydrant houses, or mounds of snow. During dull days Great Horned Owls, *Bubo virginianus*, perched on the corners of buildings. After dark many of these birds were observed to pass overhead, disturbed from their perches on low buildings.

Testimony as to the great numbers of *Microtus* destroyed by these birds was to be found in the

scores of pellets picked up at the foot of local power line poles and the corners of out-lying buildings. Many of these pellets were examined and in every instance were found to contain the hair and bones of *Microtus* only.

Previous to the time when the ground was covered with snow much damage was done to standing hay and drying potatoes; growing beets and carrots were nibbled at the ground level. Bales of hay stored during the winter were converted into chaff.

Following every snowstorm the ground would be freshly criss-crossed with countless runways made by *Microtus*. Many voles were killed by hand as they moved from one crabapple tree to another. In November 1937, Indians mentioned that *Microtus* were just as abundant at their trapping grounds nine miles north of here.

Microtus were found in the most incredible places. An instance which illustrates this is extracted from notes made September 28th, 1937: "While examining some work which had been done at the foot of the dam during the summer I picked up a pair of discarded oiled linen trousers to see if they were of any value and to my astonishment eight *Microtus* dropped out of one leg; examination of the trousers leg showed a large nest made of shredded paper and rope. The astonishment of the discovery was caused not so much by finding them in the trousers as it was by the distance of the nest from food supply. The nest, on the north and west, was cut off from the woods by water discharging through another sluice gate and on the south by the steel and concrete of the dam. The woods to the east are about five hundred feet distant and are reached only over a perilous terrain of loose boulders and pools".

Twice during the winter we captured *Microtus* alive but they lived only a short time in captivity. We were much amused by the human-like way these creatures grasped grass stems with one or both forefeet while eating and also by their very frequent interruptions of meals to wash their faces and feet. We introduced the head of a dead *Microtus* into the cage occupied by one of these captives and were much surprised at the ferocity with which it was attacked, accompanied by loud squealing

After the snow melted the great destructiveness of this vole became apparent; lawns were a mass of runways cut to the roots of the grass; lilac and crabapples were completely destroyed; roses, honeysuckle, currants, gooseberries, American mountain ash and *Potentilla* were severely damaged. Large nests constructed of grass cuttings were found in the heart of rose bushes. One nest in a field had four entrances leading to four different tunnels in the snow.

Previous to first snow a considerable amount of brush had been cut for fire protection purposes and the brush had been piled for burning in spring. Examination of these piles in spring showed that willow, birch, cherry, alder and poplar had been stripped of bark by *Microtus* during the winter; poplars up to four inches in diameter were entirely stripped of bark. During the months from October 1937 to April 1938 a total of eighty *Microtus* were trapped. Although time did not permit saving all these as specimens they were all sexed and measured, and in all cases external parasites were collected and stomachs were preserved.

A few external parasite counts for heavily infested specimens were recorded among which the following were outstanding:—

November 19th, 1937	93 ticks
April 4th, 1938	88 ticks
April 7th, 1938	140 ticks
April 18th, 1938	161 ticks

Very few fleas were collected. All fleas, ticks and sucking lice were sent to Dr. Arthur Gibson, Dominion Entomologist, who is having them identified. Duplicates have been preserved for donation to the Royal Ontario Museum of Zoology along with all skins and stomachs saved.

The following record of sexes as recorded by months is interesting:—

	Males	*Females*
October, 1937	3	2
November, 1937	27	18
December, 1937	1	3
March, 1938	10	1
April, 1938	12	3

Records for March 22nd, 1938, showed that all males had testes enlarged. Records for April 30th, 1938, show "No *Microtus* trapped or seen for a week". During six weeks in May and June, 1938, a Hairy Woodpecker's nest was under observation for an hour morning and night every day and during that time traps were set along the route between my home and the site of the nest. Although it was impossible to save the skins of the *Microtus* trapped during that period record of the sexes was made and of more than twenty sexed *not one was a female.*

In October 1938, Indians returning from Moosonee to their winter trap lines here, reported *Microtus* had disappeared along the Mattagami River and that foxes and weasels

were very plentiful. The latter were reported as being abundant in July, 1938. *Peromyscus*, which was also common during 1937 is now scarce. Shrews especially *Sorex cinereus* were more numerous during 1937 than for many years previous but they also are absent this winter, 1938-1939.

My records show that *Microtus* were to be found far back in the poplar woods and all Indians agree that this was also their experience.

I wish to thank Professor Dymond, Director of the Royal Ontario Museum of Zoology, Messrs Snyder and Cross; members of his staff and Professor Coventry, University of Toronto, who read this little paper and made many valuable suggestions.

THE FEEDING HABITS OF AMERICAN MERGANSERS

By CYRIL COLDWELL

ON SEVERAL occasions during the winter months in recent years I have had an unique opportunity to observe the feeding habits of the American Mergansers (*Mergus merganser*) which come regularly to the Gaspereau River, Kings County, Nova Scotia, from November until March. Their food during the winter, I have found, consists almost entirely of eels *Anguilla* which the birds capture by diving. There is a special pool near my home, which is one of their favoured resorts, and a natural blind near the bank has given me a splendid opportunity to watch the birds at close range.

I have found that the birds stay beneath the water for a very brief period but they dive often. After a number of attempts an eel is caught and quickly brought, kicking and squirming to the surface. It is held for a moment or two in the bird's beak, which, with its saw-toothed formation, enables it to grip the slippery prey. The eels are always swallowed head first and when they are small, the act of swallowing is easily accomplished.

I have noticed a rather wide range in the size of the eels captured, however, and when they secure one which is, say from 10 to 20 inches long, they sometimes experience considerable difficulty in disposing of it. On one occasion I watched a female Merganser come to the surface with an eel, which I should judge was at least 20 inches long, and apparently fearing that it would get away from her, she rushed frantically to the shore-line and awkwardly clambered up on a flat piece of ice which was attached to the bank. Time and again she partially swallowed the eel but as often was seen to disgorge it on the ice after a few moments. The reason for this soon became apparent, for when the eel was approximately half swallowed, I noticed the bird's throat suddenly become greatly distended. The fish evidently had sufficient strength to bend its body, thus forming a loop in the food-tract and it seemed as though the bird being in pain, quickly threw the fish out in order to obtain relief. This happened several times until finally when the fish, weakened by the struggle, had practically disappeared, I, thinking the battle won, emerged from my hiding place. Immediately on seeing me the bird took to the air and as she flew over the water, I suddenly saw the throat become distended once more, whereupon she disgorged the fish which fell into the river with a splash and disappeared.

On other occasions I have watched them attempting to swallow medium-sized eels with considerable difficulty while in the water. This they attempt to do by continually throwing their heads back. Sometimes the eel, after having been swallowed some moments, will seem to wriggle itself half way out of the bird's bill, but the Merganser renews its swallowing efforts time and again, finally forcing its prey back into its gullet and after a short rest on the surface, as though to make sure the struggle was over, would resume fishing.

I have been observing the American Mergansers in this river for several winters and have collected a number of specimens during that season. An examination of their stomachs has revealed nothing but eels and in some cases there were from one to three ranging from 10 to 20 inches in length. The largest one I have found, in the stomach of a male bird taken March 5, 1936, had just been swallowed, and measured 22 inches.

In view of the fact that eels are said to be detrimental to valuable food fishes, such as trout and salmon, in that they destroy quantities of their spawn, Mergansers should be given credit for helping in this way to preserve nature's balance.

FURTHER NOTES ON THE BIRD-LIFE OF CHURCHILL, MANITOBA

By FRANK L. FARLEY

IN COMPANY with Mr. Albert Wilk, I spent the last few days of May and the month of June, 1938, in ornithological research in the Churchill, Manitoba, region. On our arrival at the port on May 29th, we noted many evidences that pointed to an unusually early season. Practically all the snow had disappeared from the open tundra, while the spruce woods that in former year were piled high with drifted snow during the early part of June were found to be quite open. The ice in the Churchill River showed unmistakable signs of an early break-up, and residents of the settlement predicted this would occur with the first strong wind from the south. For those who are compelled to spend the long winter in that inhospitable climate, the opening of the river each season is an event of the first magnitude.

The first week of June was moderately mild until the 6th and the favourable conditions were responsible for the arrival of large numbers of migratory birds from the south. The river broke up during the night of the 5th and the high tide the following day aided the movement of the huge blocks of ice on their way to the open waters of the Bay. However, no sooner had the river cleared than a sudden change in the weather occurred. Towards evening on the 6th, a cold wind from the north-east soon developed into a gale and during the night a raging blizzard blanketed the country with between four and five inches of snow. The storm in its fury continued uninterrupted most of the following day, and must have brought destruction to many birds, as well as to the nests and eggs of those that had already commenced nesting activities.

Hudsonian Curlews, (*Phaeopus hudsonicus*), Stilts, (*Micropalama himantopus*), and Red-backed Sandpipers (*Pelidna alpina*), and possibly other waders which had already mated and taken possession of their chosen nesting grounds had as far as we could see forsaken the tundra during the storm. Only such hardy species as Horned Larks, (*Otocoris alpestris*), Lapland Longspurs, (*Calcarius lapponicus*), Tree Sparrows, (*Spizella arborea*), White-crowned Sparrows, (*Zonotrichia leucophrys*), and Redpolls, (*Acanthis sp.*), braved the storm on the wind-swept tundra, taking refuge in the shelter of willow and spruce clumps growing here and there on the open spaces. A walk over the area in the vicinity of our cabin, (located about four miles south of Churchill), on the morning of June 8th, revealed the fact that many paired waders were in their accustomed places, showing no signs whatever that the inclement weather had interfered with their nesting plans. A nest with four eggs of the Hudsonian Curlew was found on the exposed tundra, and the owners, both in the vicinity, strongly objected to our presence in their domain. The following day a Stilt Sandpiper flushed from her nest of four eggs. In these two cases, at least, the birds must have remained on their eggs during the storm. On June 10th a nest of the Stilt Sandpiper was found which held two cold eggs, and this was later found to have been abandoned. That many waders deserted their nests and eggs as a result of the blizzard was clearly evidenced later in the month, when numerous nests were discovered with two and three eggs only. Such were undoubtedly second attempts at nesting.

During the summer of 1938 a total of 82 species and subspecies of birds was noted in the region, two of which had not previously been recorded at Churchill. Particulars of the latter are as follows:—

EASTERN PHOEBE (*Sayornis phoebe*).—Mr. William Rockefeller of the American Museum of Natural History collected a Phoebe on June 18th near the gravel-pit six miles south-east of Churchill. On June 22nd Mrs. Junea Kelly, of Alameda, California, observed another Phoebe near the same place, and this was most likely the mate of the one collected by Mr. Rockefeller.

WHITE-RUMPED SHRIKE (*Lanius l. excubitorides*).—On July 1st, Mr. Wilk collected what he believed to be a Northern Shrike (*Lanius b. borealis*) thinking no other member of the family would be found in that high latitude. The skin was sent to Dr. Peet of the University of Michigan, who later advised Mr. Wilk that the bird was a White-rumped Shrike.

On June 22nd, 1938, Mr. Wilk saw a pair of Bronzed Grackles (*Quiscalus q. aeneus*)

in the same vicinity as where he found a nest of the species and collected one of the juveniles, in July 1937. (*Can. Field-Nat*) vol. LII. p. 119.

On July 7th, 1938, Mr. Wilk saw a male and female Red-winged Blackbird (*Agelaius phoeniceus*) in the same general locality as where he had two males of the species under observation, July 6th, 1937. (*Can Field-Nat.* vol. LII. p. 119).

On our arrival at Churchill, May 29th there was a noticeable absence of Snowbirds (*Plectrophenax nivalis*) which in other years were abundant during the early part of June. They had evidently passed on to the north to their nesting grounds. The last noted at Churchill, during the northern migration, was on June 13th when a single bird was seen. According to Mr. Wilk, who remained in the vicinity of the port until after the middle of July, the first ones returned on their southern migration July 15th. Their absence from Churchill, therefore, was only 32 days.

During the months of June and July 1936 and 1937, about 100 Horned Larks, Lapland Longspurs and Tree and White-crowned Sparrows were trapped and banded at our cabin. Of these 13 were re-captured in June of 1938: 12 of the Larks and a single Longspur. Of the White-crowned Sparrows trapped, four out of five were *gambeli*.

When walking through the spruce woods that border the eastern shores of Lake Isabelle on May 31st, 1938, the desiccated remains of a Mourning Dove (*Zenaidura macroura*) were picked up from the mossy carpet under a spruce tree. Evidently the bird had been dead two or three days. Most of the flesh on its body had been devoured and the head was mutilated. A short time before entering the woods a Duck Hawk, (*Falco perigrinus*), and a Pigeon Hawk, (*Falco columbarius*), had been seen, and it is more than likely that the Dove had been killed by one of these predators. It is an odd co-incidence that the only other record of the species for the region was one secured under similiar conditions, when the remains of a dove were found at Mosquito Point, June 21st, 1930, by Mr. Bert Lloyd.

On June 11th, 1938, Mr. Wilk came across two wounded Knots, (*Calidris canutus*) that were fluttering in the grass along the right-of-way near the gravel-pit. Picking them up, he found that each had a broken wing; otherwise they were in good condition. Evidently they had hit the telegraph wires strung along the railway and met their fate when passing the farthest north obstruction of that nature on this part of the continent. Considering the great distance these birds had travelled from their winter home in southern South America, and the innumerable lines of communication wires they had safely navigated, to meet this tragedy a mile from the shores of Hudson Bay, and beyond which would have been clear sailing to their summer home on some island in the Arctic, is certainly a remarkable example of the irony of fate.

The strange behaviour of a Pintail Duck, (*Dafila acuta*), setting for three weeks on a smooth stone in an unfinished nest seems worthy of mention in these notes. One day in mid-June when Mr. Wilk and the writer were walking along the narrow-gauge railway south of our cabin, a Pintail flushed from an unfinished nest, scooped in the gravel only a few feet from the track. In the "scoop," which was unlined, was a smooth white stone about the size of a duck egg. At the time we thought the bird had been disturbed while in the act of making her nest. However, when passing the place a few days later, the duck again flushed and an investigation revealed the fact that no change had taken place in the nest or its contents. During the following two weeks we frequently passed the nesting site and each time the bird flopped away in the usual "duck manner". There were no feathers, down or grasses in the hollow, and the egg-sized stone, always warm, lay in the center of the "scoop".

After my departure from Churchill, Mr. Wilk continued his interest in the peculiar situation, and wrote to me as follows; "One day I brought two eggs that I took from the nest of an Old Squaw, (*Clangula hiemalis*), and placed them in the Pintail's nest beside the stone. A few days later I found the eggs had disappeared and I thought they might have hatched and the young had found their way to the lake (about 50 feet distant). I was puzzled, but on looking out on the lake I saw a raft of about 20 young Squaws in charge of one mother duck. As you know, it is customary for a single duck of this species to look after several broods of young and it is possible the two had joined up with them. The same afternoon I found a Red-breasted Merganser's (*Mergus serrator*), nest with eggs about ready to hatch and I gave one of these to the Pintail. A few days later the nest was visited and it was quite evident that the duck

had abandoned the nest as she was never seen again. Talk about motherly instinct; she certainly had it." The question naturally arises; what was the cause of her peculiar actions? Had her first clutch or clutches of eggs been destroyed, or may the trouble have been her inability to produce eggs?

NOTES AND OBSERVATIONS

Celerio lineata IN ONTARIO.—Readers of *The Canadian Field Naturalist* particularly those of the Entomological group will recollect the very large numbers of the Striped Sphinx, *Celerio lineata*, that were seen throughout Ontario in the summer and early fall of 1937. Enquiry among collectors known to the Royal Ontario Museum of Zoology, seems to show great scarcity in the present year, only two records having been made, one by Mr. F. A. Urquhart, who saw a specimen in August, at Point Pelee, and one by Mr. C. E. Hope also in August at Favourable Lake, Lat. 53°N. It is curious that north and south should furnish the only reports; the writer hopes that more reports may be sent in by observers seeing them during the 1937 season, also any reports of larvae. The Museum now possesses *one* authentic specimen bred from a native larva. This larva was found at St. Davids, Ontario, and the specimen dated August 25, 1931, was contributed by Mr. D. F. Patterson in November, 1937. The migration of this moth into England under its subspecies name *Celerio livornica* Esp. has been made the subject of somewhat intensive study by Mrs. K. J. Grant, *Trans. Roy. Ent. Soc.* 86; 345-357. 1937, who states that the species is really of desert origin, and the records show very great variation in numbers arriving along the southern coasts, much resembling our experience of last year. The Museum hopes to collect, yearly, reports of the occurrence of this moth in Ontario, as it seems to be a typical migrant. — CHARLES E. CORFE, Royal Ontario Museum of Zoology.

WESTERN TANAGER AT KAMOURASKA, QUEBEC.—On June 10, 1938, my attention was attracted by the song of a bird which seemed to me to be strange for my neighbourhood. This song (which might be confused with that of the American Robin, *Turdus migratorius*, and which might perhaps be translated by these three notes "*Tu ute—tu ute—tu ute*") appeared to come from a small stream bordered with ash, black willow and other small trees. I was not long in discovering, in the ash tops, a small bird of a lemon-yellow colour, which I could not identify at first. While I was observing it I saw it leave the tree tops several times to hover for a few moments above the stream, as is often done by the Cedar Waxwing (*Bombycilla cedrorum*).

I decided to collect it, and to my great astonishment perceived at once that what I had was an adult male Western Tanager (*Piranga ludoviciana*) in perfect plumage. This bird had no mark which might indicate that it had been kept in captivity, or had escaped from a Zoological Garden. I have mounted it and it is part of my ornithological collection.—WILLIE LABRIE.

EXTENSION OF THE BREEDING RANGE OF THE INDIGO BUNTING IN ONTARIO.—Baillie and Harrington (*1937, Cont. Roy. Ont. Mus. Zool., 8.* "The Distribution of Breeding Birds in Ontario") have recently reviewed the status of the Indigo Bunting (*Passerina cyanea*) in Ontario. Using Snyder's recent plan for Ontario subdivisions (*C.F.N. 53: 22-24, 1939*), we see that until 1935 its range was limited to Southern Ontario, breeding throughout this territory, but more commonly in the southern portion. In 1935 they reported two sight records for Western Ontario, one at Whitefish Lake and the other at Sioux Lookout. In Manitoba it is considered a rare summer resident of the southern portion of the province where a few breeding records have been reported in recent years. It is generally distributed throughout Minnesota but is considered common in only the south-eastern quarter. However, there are a few breeding records for the northern counties.

Whitefish Lake is 50 miles south-west of Fort William in the District of Thunder Bay.

For many years this area has been extensively studied by Col. L. S. Dear, but his records do not include the Indigo Bunting. The above ornithologist and the writer spent the third week of June, 1938, in this area. On June 18th we visited the locality where Baillie and Harrington had seen an Indigo Bunting in 1935 and were fortunate enough to find a nest and 2 eggs of this species in a bush of the Salmon Berry (*Rubus parviflorus* Nutt.), which is locally abundant. On June 24th the nest was again visited; it still contained but two eggs. We did not see this species during the week spent in the area, but subsequently we were told that a pair of these birds had been seen near the above nesting site. On revisiting the locality we were rewarded by seeing a singing male. Apparently the Indigo Bunting is another species which is extending its range northward as the country becomes more opened up due to fires and settlements.—A. E. ALLIN.

THE NORTHERN CHIPMUNK IN PARRY SOUND DISTRICT, ONTARIO.—During eight summer visits to Pickerel Lake, about seven miles east of Burk's Falls, Ontario, (which is 168 miles north of Toronto), between 1934 and 1938, it was never my good fortune to observe one of these chipmunks, despite rather careful scrutiny of the more obvious mammal life of the lake's vicinity.

In July, 1938, however, individuals of the Northern Chipmunk (*Eutamias minimus borealis* [Allen]), were seen by me on the 10th, 16th and 17th, the individual observed on the 16th being secured, and placed in the collection of the Royal Ontario Museum of Zoology.

It seems unlikely that such a conspicuous little animal should have been overlooked by me during all previous visits to the area, and it is my belief that the species is moving into the area from more northern parts.

The observation of the Northern Chipmunk at Pickerel Lake seems to mark the most southern record for the species in Ontario, previously known to occur only as far south as Noganosh Lake, Parry Sound District, (45 miles to the west and slightly north) and Lister township, Algonquin Park, (40 miles to the east and a trifle north). Their presence fairly commonly at Noganosh Lake was established in August, 1929 by [1]Dr. W. E. Saunders and the specimen (in R. O. M. Z.) from Lister township was obtained on August 3, 1930 by Dr. D. A. MacLulich.—JAS. L. BAILLIE, JR.

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[1]W. E. Saunders, *Can. Field-Nat.*, XLIII, No. 9, Dec. 1929, p.208.

FLICKER REARS STARLINGS.—While fishing near Dorchester, Ontario, on May 24, 1938, I noticed a Flicker fly to a large hole in a six-inch stub, carrying food and soon return with excrement. On timing a subsequent trip I was able to catch the female bird on the nest and banded her 37-348290. Examination of the nest revealed three young, not Flickers, but our naturalized nuisance, the Starling, all too young to band. The nest was a typical Starling structure of chaff, grass, straw and poultry feathers.—WILLIAM M. LOTT.

UNUSUAL RECORDS OF BIRDS IN ALBERTA.—An American Rough-winged Swallow (*Stelgidopteryx ruficollis*) was collected in flight on May 8, 1937, from a small group circling around a cliff at Rosebud. On various dates in May, others were seen but it is not known if they nested in the district. In 1938 Rough-winged Swallows were again seen on May 8 in flight over a prairie slough. On June 27, 1938, a pair was seen which were obviously nesting somewhere in the immediate vicinity. One was secured and proved to be a female in breeding condition. This, as far as I can ascertain, is the first indication of these birds breeding in Alberta.

On May 14, 1938, while collecting waders around a prairie slough near Rosebud, I noticed an unusual robin-like bird foraging in the washed-up wastes. After some difficulty, it was collected. It was a female Varied Thrush (*Ixoreus naevius*). Just how this bird came to be on the prairies of Central Alberta is hard to imagine.

During the season, 1937-38, a flock of blackbirds wintered near Camrose, Alberta. Mr. F. L. Farley kindly secured a specimen for me which proved to be a male Brewer's Black-

bird (*Euphagus cyanocephalus*). This is the first record we have of Brewer's Blackbirds wintering in Alberta.—W. RAY SALT.

AN INTERESTING CORN SHOCK FAUNA.—On February 20, 1932, near London, Ontario, I helped a farmer load corn to be hauled to the barn. The corn had been shocked in the usual cone shape at harvest time, and had stood in the field ever since.

From the first shock it was evident that each housed an abundant mammal population. There were large numbers of house mice (*Mus musculus*) and field mice (*Microtus pennsylvanicus*) and one deer mouse (*Peromyscus* probably *bairdii*) was seen. In addition, both European hare (*Lepus europeus*) and cottontail (*Sylvilagus floridanus*) had used the shocks for shelter, and fragments of cobs in the nearest woods told of the visits of black squirrels (*Sciurus carolinensis*).

Each shock was taken apart carefully. In one, right at the top, was a cache of a number of dead *Microtus*. We took the corn away cautiously, hoping to find a weasel. Finally, from the bottom of the shock a large house rat (*Rattus norvegicus*) sprang out, and, since there was no sign of a weasel anywhere it would seem that the cache was his. Curiously enough a nest of the house mouse a few inches from the cache had not been disturbed.

Needless to say, the corn was considerably damaged in all shocks. — C. H. D. CLARKE.

BANDING NESTLING CROWS.—The Illinois Co-operative Crow Investigation appeals to bird banders to make a special effort to band nestling Crows. Familiar though the Crow may be, many details of its life history remain unknown and a special effort on the part of banders to put bands on as large a proportion as possible of this year's crop of young may well yield valuable results —ED.

REVIEWS

PLACER MINING ON THE ROGUE RIVER, OREGON, IN ITS RELATION TO THE FISH AND FISHING IN THAT STREAM. by *Dr. Henry Baldwin Ward. An Ecological Study made for the Oregon State Department of Geology and Mineral Industries, September, 1937—May, 1938. Bulletin No. 10.*

This report may be of some interest to fishermen as well as to other persons. It will be evdient that the conclusions apply to the conditions as they exist on the Rogue River at the present time and do not necessarily apply entirely to conditions elsewhere.

Dr. Ward points out:

1. That the Rogue river has always carried large amounts of silt and at the same time has always supported a large population of salmon and trout.

2. That silt is not a pollutant in that it carries no chemically active deleterous substances; quotation is made from Dr. M. M. Ellis who states that silt (*a*) does not decrease dissolved oxygen, (*b*) does not increase acidity, (*c*) does not increase alkalinity, (*d*) does not increase specific conductance, (*e*) does not increase ammonia, (*f*) is not toxic on fishes

3. That many salmon and trout streams between California and Alaska are seasonally and some constantly loaded heavily with silt that comes from glacial run-off and from bank erosion.

4. That there is no evidence that the intensive placer operations of the early years had any effect in reducing the runs of salmon and trout; on the other hand the reduction in numbers of fish in recent years can be attributed to modification of stream conditions consequent upon settlement of the land in the drainage area and to increased fishing effort.

5. That the placer mining is not carried out during the low water period because of the lack of water for operations; no storage systems being used

Investigation showed:

1. No evidence that silt in the Rogue river

forms a blanket on the stream bed to cover fish foods or spawning grounds with an impermeable layer; in any case, the spawning areas lie chiefly above the locations of the placer mines

2. No evidence that the suspended sediment is injurious to fishes. Experiments by Dr. L. E. Griffin with young chinook (spring) salmon and young cutthroat trout showed that for periods of 28 and 18 days respectively these fishes lived in sediments obtained from the placer mining areas and in amounts equal to and greatly in excess of those occurring in the Rogue river without injury and with growth rates equal to those of fish in clear water.

3. That turbidity measurements at Grant's Pass above the mining area were at times during the months of January, February, March and April, higher than those at Agness below the mining area; measurements on small streams close to mine workings were higher than those at Grant's Pass in at least two instances

On the basis of his observations during September, 1937, and during March and April, 1938, the turbidity measurements and the experiments by Dr. Griffin, Dr. Ward concludes that the addition of sediments from the placer operations as at present conducted on the Rogue river is not inimical to fish.—W. A. C.

PROCEEDINGS OF THE NOVA SCOTIAN INSTITUTE OF SCIENCE, *Halifax, Nova Scotia, Vol. 19, 1937-1938, Part 4, pp. 293-454.*

Two of the four scientific papers are of direct interest to field naturalists. *The Bird Life on the Grand Manan Archipelago,* by Olin Sewall Pettingill, Jr., brings together the work of a long line of famous ornithologists beginning with Audubon, with that of the author and his contemporaries and associates. The result is a complete avifauna, listing 275 species. *The Fish Population of Lake Jesse, Nova Scotia,* by M. W. Smith is a study based on a sample of fish from a lake in which the entire fish population was destroyed by treatment of the lake with copper sulphate.—C. H. D. C.

REPORT OF THE ONTARIO FISHERIES RESEARCH LABORATORY, 1938.

Seven research projects are summarized including a study of parasites and one of small mammals all carried out in 1938 at this active research station in Algonquin Provincial Park, Ontario. Two new publications (No. 56 and 57) have recently been issued.—C. H. D. C.

OUR WILD FLOWERS: a plea for Protection, *by Frank Morris. Publication No. 3, Federation of Ontario Naturalists, 198 College St., Toronto, Price 10 cents.*

Propaganda has perhaps seldom assumed such an attractive form as this. The biology of plant life is described in simple language, and wild flowers are shown to be integral parts of ecological units which embrace the members of the animal kingdom as well. The beauty of wild flowers is described in terms of sugar bush, woodlot, swamp, muskeg and field which are sure to strike responsive chords in all lovers of the countryside.

No laws or restrictions are advocated. Instead the appeal is for unselfish thoughtfulness. We are asked to leave the flowers in their natural setting, and neither to pick nor transplant, nor to buy from those who do. The protection asked is for the whole plant and animal community in sanctuaries where plants and all forms of wild life may be given absolute protection.

Three flower paintings of Robert Holmes are reproduced in colour, the Showy Lady Slipper being from Sam Wood's "Rambles of a Canadian Naturalist." There are also several excerpts from the "Rambles" with ornamental heads, and a photograph of the White Trillium, Ontario's Emblem Flower.

While this pamphlet will be a boon to teachers its lessons are for adults as well as children. It is a splendid contribution to the cause of conservation.—C. H. D. C.

THE NATURAL RESOURCES OF KING TOWNSHIP, *by K. M. Mayall, Toronto, 53 pages, 9 maps, 3 tables, 8 plates, 1 figure.*

This publication is the result of a detailed survey of a rural township near Toronto,

sponsored by Mr. Aubrey Davis, of Newmarket, Ontario. Prompted by memories of the different and more pleasant township of his boyhood, Mr. Davis gathered together a committee of conservationists to discover how the deterioration which he had observed could be checked. A survey of the township was carried out by K. M Mayall and a plan for the rehabilitation of woods, waters and wild life was drawn up. It is of the greatest interest to find the problems of erosion, falling water table and deterioration of streams, woodlots, and wild life resources, revealed on the scale of an Ontario township. The measures needed to make the township a more pleasant place for naturalists are precisely those that will restore health to the land and stability to the rural economy.—C. H. D. C.

A NEW "NOMENCLATOR ZOOLOGICUS".

The Zoological Society of London announces the near-completion of this work which will bring together the names of genera and subgenera in Zoology from the 10th edition of the Systema Naturae up to the end of the year 1935. An advance rate of six guineas for the whole edition of four volumes is proposed. Dr. Sheffield Neave, of the Imperial Institute of Entomology, is the editor.—C. H. D. C.

LIVING THINGS—HOW TO KNOW THEM, *by H. E. Jaques, Mt. Pleasant, Iowa, 1939, $1.00.*

A general guide to nature that might well be very useful to teachers.—C. H. D. C.

MICHIGAN DEPARTMENT OF CONSERVATION, NINTH BIENNIAL REPORT, 1937-1938. *Lansing, pp. 1-315.*

Ontario naturalists in particular will be interested in the population data on Whitetailed Deer, and in the status of certain other species in Michigan. The Badger "inhabits all suitable areas in the Lower Peninsula and southern portions of the Upper Peninsula". The European Hare seems to have entered the state from Southern Ontario. The Opossum had a "phenominal increase" from 1926 to 1935, but suffered a "sharp decline" in 1935-36. In some areas Fox Squirrels are "very abundant".—C. H. D. C.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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The Canadian Field-Naturalist

VOL. LIII OTTAWA, CANADA, MAY, 1939 No. 5

THE SNOWSHOE RABBIT ENQUIRY 1937-38

By DENNIS CHITTY and CHARLES ELTON

1. General Introduction.

IN THIS and the previous six annual reports (*The Canadian Field-Naturalist*, 47: 63-69, 84-86, 1933; 48: 73-76, 1934; 49: 79-85, 1935; 50: 71-81, 1936; 51: 63-73, 1937; and 52: 63-72, 1938) the progress of the ten-year cycle in abundance of snowshoe rabbits in Canada has been followed by means of a questionnaire enquiry and by statistical treatment of opinions on the relative change in one year compared with the one before. From conditions approaching a peak in 1931-32 it has been shown how, after this peak was reached, there set in a period of widespread, though not simultaneous decline, accompanied by epidemics. During 1936-37 some regional recovery had begun, which, despite great scarcity during 1937-38, was maintained and had started to appear in other sections of the country.

The results of this enquiry, consisting of the replies to questionnaires about comparative abundance from year to year, are mapped in the Bureau of Animal Population, Oxford University, where the detailed maps and records are available for reference. Duplicate copies of the replies to the Canadian Government enquiry, of the areas plotted on tracing paper over provincial maps, and of the final maps compiled from these tracings, are also being deposited in the National Parks Bureau, Ottawa. The enquiry now covers a large sample of the total range of *Lepus americanus* in North America.

2. Canada, (D.C.) Acknowledgements

The material consisted of 585 reports covering well over a half, but less than one million square miles of country.

1. 415 reports were received from observers through the National Parks Bureau, Department of Mines and Resources, Ottawa. We are much indebted to the Controller, Mr F.H.H. Williamson, and the Superintendent of Wildlife, Mr. Hoyes Lloyd, for their continued co-operation, and to the staff of the Bureau (in particular Mr. W. D. Taylor) for their work in collecting all these replies. We also wish to thank those who continue year after year to submit their observations. The following people contributed information: Royal Canadian Mounted Police (133 observers), Officers of the Provincial Game Departments (142), Superintendents and Wardens of the National Parks (75), other observers (65), including Taxidermists, Honorary Game Officers and Holders of Scientific Permits under the Migratory Birds Convention Act.

2. 149 of the annual zoological reports of the Hudson's Bay Company referred to snowshoe rabbits. These reports were supplied by courtesy of Mr. Ralph Parsons, the Company's Fur Trade Commissioner in Winnipeg, and are published by permission of the Governor and Committee in London. Mr. R. H. G. Bonnycastle has given much valuable help organizing the enquiry in Winnipeg.

3. 21 reports from the Maritime Provinces were kindly obtained by Dr. A. G. Huntsman from officials of the Biological Board of Canada.

Duplicates of the tracings are kindly being made by Mrs. Jane Baden-Powell.

Methods

The system adopted in these reports is to weight the replies from observers on a basis of the area to which the replies (increase, decrease or no change) are referred. It is not practicable to measure the true area covered and instead a count is made of the number of 30 mile squares in which lie all or part of the regions covered. This introduces certain errors: (1) when two entirely separate regions fall in different parts of the same square they are counted as overlapping one another and (2) the areas are exaggerated for example, Nova Scotia, area 21,428 sq. miles, overlaps 44 squares, area 39,600 sq. miles. The assumption is, however, that such errors occur at random among reports of each

TABLE 1

State of the Snowshoe Rabbit population in Canada, 1937-38
(number of squares.)

	Total	Increase	% Increase	Decrease	% Decrease	No Change	% No Change	Epidemic	% Epidemic
Yukon	64	2	2- 3	63	80-98	11	0-17	0	0
Northwest Territories.	174	16	5- 9	123	52-71	76	21-44	4	2
British Columbia..	269	130	26-48	139	27-52	109	13-41	0	0
Alberta	199	125	35-63	67	10-34	101	13-51	0	0
Saskatchewan	182	137	33-75	75	9-41	85	12-47	2	1
Manitoba ...	202	71	12-35	115	20-57	115	28-57	0	0
Ontario.....	352	155	26-44	170	28-48	134	20-38	6	2
Quebec &.... Labrador	339	114	23-34	204	50-60	65	14-19	0	0
New Brunswick.	38	13	3-34	34	34-89	17	5-45	1	3
Nova Scotia .	44	42	41-95	2	0- 5	26	5-59	0	0
Total	1863	805	23-43	992	31-53	739	16-40	13	0.7

kind. Two theoretical advantages are (1) compensation for unequal distribution of observers, (2) a certain indication of the extent to which observers agree in their opinions. The first is obtained through giving equal areas the same significance whether they are covered by few or many observers, the second by expressing percentages between limits: e.g. "23—43% increase". This means that the squares overlapped by reports of increase were 43% of the whole but that only 23% were overlapped by increase uncontradicted by another type of reply. The method does not, however, state how much of the 23% was corroborated by two or more observers, nor to what extent the overlap between observers was real or only apparent.

RESULTS

The features of 1937-38 are shown in Figs. 1 and 2 and Table 1 and may be described under the following main headings;

1. *Scarcity of rabbits.* In most places numbers were so low that observers had difficulty deciding what change if any there had been compared with the previous twelve months (ending May 31st). In the figures this is reflected by a high percentage of no change reports (16-40%) and in a considerable overlap of two or three types of opinion. When changes in abundance are so slight it is questionable whether a report of no change can be considered as seriously conflicting with a report either of increase or decrease. Thus in Alberta and Nova Scotia the wide limits expressing increase are chiefly due to overlap with no change. The 35-63% increase in Alberta is made up of 125 squares, 37 overlapping with reports of no change, 10 with decrease, 9 with both. The percentage of increase uncontradicted by decrease is thus 53, compared with 35% when both no change and decrease are counted as being contradictory to increase. In Nova Scotia the revised figure is 91-95% instead of 41-95%. However, in Saskatchewan the correction amounts only to 47-75% compared with a previous 33-75%. Here, as in all the provinces further east except Nova Scotia, there is more overlap with decrease than with no change. This extensive disagreement therefore reflects a state of the rabbit population which presents real difficulties for analysis from subjective data.

2. *Continued decrease in Alberta and Saskatchewan.* During 1936-37 a certain amount of recovery took place in these provinces, particularly in Northern Alberta. The percentage of

squares reporting increase in the prairie provinces has been as follows:

	bottom of cycle		*recovery phase*	
	1934–35	1935–36	1936–37	1937–38
Alberta.....	17–34	15–35	18–56	35–63
Saskatchewan	3–30	6–30	12–44	33–75
Manitoba....	14–32	3–12	16–32	12–35

The figures for 1937-38 indicate that recovery has gone ahead for a second year in Alberta and Saskatchewan, but remained sluggish in Manitoba.

3. *Start of recovery in Ontario and the Quebec peninsula.* The map showing increase for 1936-37 was almost a complete blank for Northern Ontario and the whole Quebec peninsula. During 1937-38 patches of increase appeared, and although decrease reports were still in the majority for the third consecutive year it seems that some recovery may have begun.

4. *No recovery yet in Yukon, Northwest Territories or Northern British Columbia.* In 1934-35, while the provinces east of British Columbia were reporting high percentages of decrease there continued to be reports of increase from the North-west. In the two following years a steep decline set in, though snowshoe rabbit numbers still remained high in local sections of the Yukon as late as 1936-37. As might be expected from the later appearance of the "crash", recovery in these parts had not yet become obvious. In the Yukon and Northwest Territories reports of increase were practically negligible. In British Columbia the figure for increase (26-48%) requires further analysis.

As has been said in a previous report, the grouping of the figures by provinces is not a natural arrangement, but is the only procedure that can be carried out in the relatively short time between receiving the reports and sending the manuscript to press. In British Columbia there are areas, yet to be defined, in which fluctuations, where they occur at all, are not synchronous. It was not until one or two years afterwards that the decrease reported in 1934-35, south of a line from the tip of the Alaskan pan-handle to the Peace River, spread to any great extent north to the boundary. It was this same region, excepting an area of 18 squares north of the Peace River, from which signs of recovery were absent during 1937-38. The other 112 of the 130 increase squares referred to conditions in the central and south parts of the province—where increase also took place in 1936-37.

5. *Increase in Nova Scotia.* There seems to have been a marked recovery in this province, the only decrease reported being from near the border of New Brunswick. Elsewhere, particularly on Cape Breton Island, the bulk of the replies indicate a definite increase in numbers. In New Brunswick some slight recovery apparent in 1936-37 did not become more general. Many of the replies suggest that excessive killing for fox farms and for human consumption may be interfering with increase.

6. *Lack of epidemics.* During 1936-37 a few patches of epidemic were still reported, particularly in Quebec. In 1937-38 such reports were so few that it has not been worth while publishing a special map. There was a report from Fond du Lac, Saskatchewan, and north of it; one from Gogama, Ontario, one from New Brunswick.

3. UNITED STATES AND ALASKA (C.E.)

UNITED STATES

Through the cooperation of observers reporting through the U. S. Bureau of Biological Survey in Washington, D.C. it has been possible to map for a fourth year something of the fluctuations of *Lepus americanus* outside Canada. The recurrent regularity of the ten-year cycle over much of Canada for at least 120 years (proved by examination of the Hudson's Bay Company's records), and the wide regional extent of the cycle, make it of great interest to know how far the cycle is maintained towards the edge of the snowshoe rabbit's range in the north-eastern United States and in Alaska. Also, although only a relatively small part of the range of *Lepus americanus* falls within the United States, the actual area is a huge one in which this species plays a considerable part in wild life inter-relations. The absence of any full historical records of fluctuations in the United States makes it all the more desirable that current cycles should be recorded over a large area by a standard method.

We wish to thank the Chief of the Biological Survey, Dr. Ira N. Gabrielson; and the Chief of the Division of Wildlife Research, Dr. W. B. Bell, for giving facilities; and Dr. H. H. T. Jackson of that Division, for organizing the questionnaires. Although the number of replies is not very large, Dr. Jackson has been successful in obtaining information of a high degree of reliability, by choosing observers with the right kind of opportunities and field experience. A particularly full report was supplied by the Wisconsin State Conservation Department.

The total number of replies was 55, of which 39 were mapped on the grid system, the rest mostly containing very useful records not in a form suitable for exact mapping *e.g.* the area

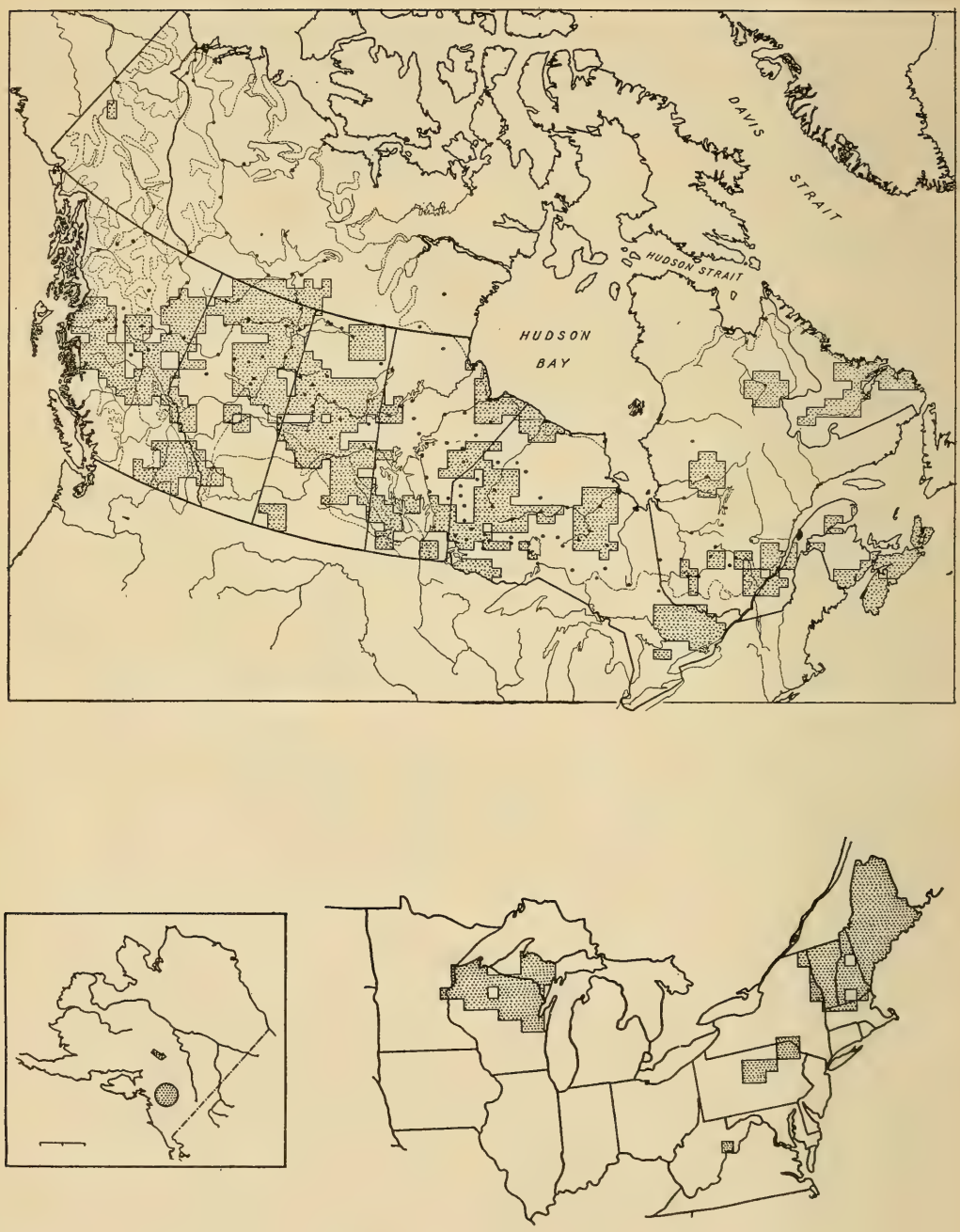

Fig. 1. State of the snowshoe rabbit population in 1937-38. Dotted areas are groups of squares overlapped by areas of observers reporting relative INCREASE in 1937-38 over 1936-37. Larger black dots are Hudson's Bay Company posts. Broken lines in Canada show main vegetation zones. Thick black lines are Province or State boundaries.

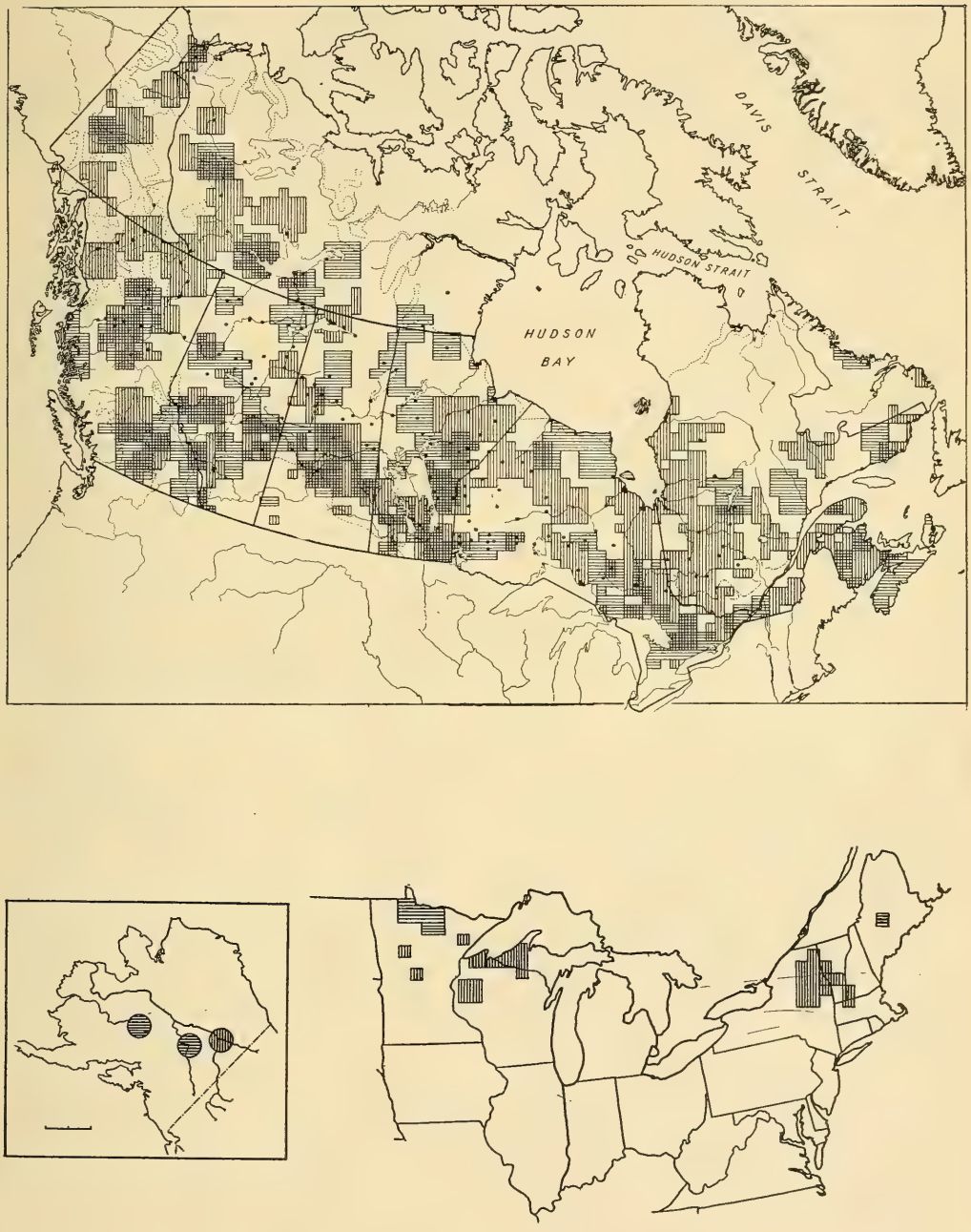

Fig. 2. State of the snowshoe rabbit population in 1937-38. Vertical hatched areas, are groups of squares overlapped by areas of observers reporting relative DECREASE in 1937-38 over 1936-37. Horizontally hatched areas, NO CNANGE.

too large or else not defined accurately. Copies of the questionnaire replies are on file with the Bureau of Biological Survey at Washington, D.C., and at Oxford, detailed maps also being kept at the latter. No enquiry was undertaken in the Western United States this year, since previous analysis had shown the absence of any well-marked fluctuations such as occurs in Canada and the Eastern United States. The whole enquiry therefore now covers the northern forest zones of North America, but omits their extensions down the Western mountain ranges south of Canada.

The results for 1937-38 are summarized in Table 2 and mapped in Figs. 1 and 2. The figures represent the number of squares overlapped by the areas that observers cover. The total number of squares overlapped was 152, representing a gross area of 136,800 square miles. The actual area was, owing to the convention that *any* overlap counts as a whole square, much less than this, probably a little less than half. This exaggeration does not, however, seriously affect comparisons between increase, decrease and no change, which are the main point of the enquiry. These 152 squares provide a fairly good sample of the opinion of trained observers in various parts of the Eastern United States In discussing the results we assume the usefulness of the sampling and of the opinions. We may note that the only alternatives at present to the use of this intelligence system of sample subjective comparative opinions are (1) small local samples based on real censuses (such as have been taken by R. G. Green in the course of his extremely important Minnesota Wildlife Disease Investigations), or (2) a purely agnostic attitude towards wild life fluctuations on this scale. Local investigation will no doubt be the chief means of finding out the nature of population dynamics, but nevertheless it gives an inadequate picture of regional trends in numbers. It seems essential to maintain both types of enquiry, in order that we may know of what the local investigation is an example, and at the same time confirm the regional trends by real censuses at fixed stations. We claim that, provided the limitations of the present system of enquiry are borne in mind, it provides a means of canalizing economically and quickly and with the minimum of distortion by the coordinator, the opinions of experienced field observers over a very wide area. The more numerous the samples the better, provided the observations are still of a high quality. In this respect the United States enquiry is still capable of useful expansion in the direction of some of the Canadian results which now show in some zones a chain-mail pattern of observed areas.

The reports give a clear verdict of general increase in the eastern part of the region (Maine, Massachusetts, New Hampshire, Vermont, Pennsylvania, West Virginia). There are very few reports of decrease or no change except from north-eastern New York, and parts of southern Vermont. At the same time, none of the observers recorded high abundance: the picture is one of recovery just beginning after populations had reached the bottom of their cycle after the previous crash. Two examples will illustrate this situation. C. M. Aldous (for the whole of Maine): "In winter 1935-36, hares reported as being very scarce, and since that time the hare population has been showing slow but noticeable gains." Logan J. Bennet cites the official kill of snowshoe rabbits in Pennsylvania as a rough index of abundance from 1930-37: 20,602; 26,245; 19,890; 23,139; 17,995; 8,659; (closed season 1936); 2,420.

In Wisconsin also, the excellent records provided for each county mostly show a general recovery, but in almost every instance only "fair" abundance, or else still scarcity. A graph was supplied showing from hunters' reports "estimated number of snowshoe rabbits killed in Wisconsin". The numbers rose from 437,183 in 1931 to 631,007 in 1932, after which they fell steadily to 60,081 in 1937. Although these figures may provide only a rough measure of abundance, they illustrate the scarcity still existing in the winter of 1937-38. In Minnesota the reports also indicate scarcity, with either continued decrease, or no change. R. G. Green (Lake Alexander area, north-central Minnesota) gives the following April census figures per square mile for 1933-38; 478, 374, 356, 246 (corrected), 151, 32. (He is publishing very full reports of his investigations in the *American Journal of Hygiene*). Marius Morse (for an area in northern Minnesota) reports: "Probably less than 100 individuals present (by census) on 4 square miles sample area in springs of 1937 and 1938. No change." Gustav Swanson (for Itasca Park, Clearwater County, Minnesota) reports: "Very rare. Only 3 or 4 seen during 5 weeks in the area." J. Manweiler (for part of Lake of the Woods, Beltrami, and most of Koochiching counties, northern borders of Minnesota), on the basis of extensive trapping and tagging and other field work, states: "Generally we found that the cycle of the snowshoe hare was delayed from one to two years over that in Wisconsin... Since the winter of 1936-37 the snowshoe hare has been extremely scarce throughout our region and at the present writing does not seem to have

TABLE 2.

Records of Snowshoe Rabbit population trends in the Eastern half of the United States, 1937-38.
(number of squares overlapped by observers' areas.)

	No. of observers	Total no. of squares	Increase	% Increase	Decrease	% Decrease	No change	% No change	Epidemic	% Epidemic
Maine	4	49	48-49		0		0-1		0	
Massachusetts	1	1	1		0		0		0	
Michigan	2	14	7		6-7*		0		0	
Minnesota	4	13	0		2		11		0	
New Hampshire	1	4	4		0		0		0	
New York	1	10	0		9-10†		0		0	
Pennsylvania	1	9	9		0		0		0	
Vermont	3	17	11-17†		0-4		0		0	
West Virginia	1	1	1		0		0		0	
Wisconsin	21	34	24-33*		0-8		0		0	
	39	152	105-121	69-80	17-31	11-20	11-12	7-8	0	0

* 1 overlap between Michigan D. and Wisconsin I.
† 3 overlaps between New York D. and Vermont I.

increased any whatsoever." This area lies very near the western limit of the species in Minnesota.

To sum up: the snowshoe rabbit populations in the Eastern States are still near the bottom of their cycle. In the eastern parts of the region recovery was definitely under way, as also in Wisconsin and parts of Northern Michigan. Minnesota lagged behind these other areas. If the United States cycle follows the typical Canadian one, we may expect continued increase now for several years.

ALASKA

During the last five years reports have been received from the Alaska Game Commission and a few other observers in touch with the U. S. Bureau of Biological Survey. For the season 1937-38 there are four reports from officers of the Alaska Game Commission, received through the cooperation of Mr. Frank Dufresne, Executive Officer of the Commission at Juneau; one from Mr. J. W. Warwick of the U. S. Biological Survey at Fairbanks; and one from Mr. Harry J. Liek, Mount McKinley National Park, through courtesy of the U. S. National Park Service. The only district for which a continuous sequence of records for five years has been obtained is Fairbanks (Tanana River) and surrounding country. Here snowshoe rabbits increased steadily until 1935-36, remained abundant without decreasing in 1936-37, but began to show disease in April, May and June 1937 and were less abundant (Warwick) or no change (Game Commission) in the season of 1936-37. This cycle has evidently followed the same general course as that in Canada, but the peak (1936) was two years later than the main peak in the North-West Territories (1934). Parts of the Yukon remained at a high level as late as 1936 but showed decrease by 1937. Mr. Warwick notes that the previous crash after abundance occurred round Fairbanks in 1924-25 The Commission's report which gives "no change" for fifty miles round Fairbanks, adds: "Still plentiful, but thinned out in adjacent regions to north and west."

North of this, in the country round Fort Yukon on the Upper Yukon River, there was fair abundance in 1936 (following increase in 1933-34, 1934-35,—no record for 1935-36), but decrease in 1937-38. These records indicate that the rabbit decrease had finally begun to take place

by 1937, in the Canadian Yukon and in the Upper Yukon and Tanana regions of Alaska. To the south, in the country around Copper Center in south-central Alaska, increase and abundance still continued ("expected to reach top of cycle this winter of 1938-39"). To the west, in the region around McGrath, on the Upper Kuskokwim River, there was no change ("no apparent increase from low point in cycle," the last recorded peak being in 1926-27). This record indicates a complete failure to recover during the last cycle period. This area is near the limit of range and of suitable habitat (for the country here is "willow bush and stunted spruce"). Mount McKinley National Park reported increase, the previous cycle peak having been 1925, with great scarcity in 1928. Some good notes on *Lepus americanus macfarlani* in this Park have been published by J. S. Dixon (*Fauna of the National Parks of the United States* Fauna Series No. 3, pp. 194-6, 1938). Another paper, by C. B. Philip (*J. Mammalogy*, 20: 80-86 1939) contains valuable parasitological records from the snowshoe rabbit in Alaska (including the demonstration of tick-borne tularemia in snowshoe rabbits in the Fairbanks area). His notes on reproduction and abundance are also valuable, and we agree with his comment that the Alaskan cycle presents local irregularities, and that the forecast by one of us (C. E.) in 1936, failed to anticipate the delay of a year or two in the onset of decrease in the Alaskan populations. For the present, it is clearly most profitable to continue collections of records for a good many years, in order to find out how far and why Alaska differs in its snowshoe rabbit periodicity from the main part of Canada.

4. SUMMARY

585 reports for the season 1937-38 were received from Canada. This year was the second of a patchy recovery in snowshoe rabbit numbers in northern Alberta, Saskatchewan and central British Columbia. In Manitoba, Ontario and the Quebec peninsula recovery was much less far advanced, and in the North-west there was none. These stages of recovery correspond to the sequence during 1933-37 in which the decline set in. Increase was definitely under way in Nova Scotia, but not in New Brunswick. The great scarcity of rabbits, which still prevails generally in Canada, has led to much more confusion in the estimates of relative abundance than has been the case in past years.

55 reports were received from the United States. They indicate that the bottom of the cycle had been reached and that recovery had begun over wide areas in the Eastern States. But showshoe rabbits were still scarce generally. Six reports from Alaska indicate that decline had set in in some places, but abundance still continued in others.

SOME NEO-TRIASSIC AMMONOID FAUNAS OF THE PEACE RIVER FOOTHILLS, B.C.

By F. H. McLEARN

IT IS NOW possible to distinguish the Karnian and Norian parts of what, in previous publications, has been called the *Halobia* zone of the Schooler Creek formation. Some of the identifications of species and genera are only provisional, but the faunal lists give a fair idea of the succession.

The earliest fauna of the *Halobia* zone, probably of late Karnian age, includes *Stikinoceras kerri, S. robustum, Sirenites*, n. sp., *Styrites* cf. *haugi* Gemmellaro, *Placites, Juvavites, D.* (*Anatomites*) *humi, Gonionotites?, Malayites, Miltites?* and *Dimorphites*. A little higher is a late Karnian or Tropitan fauna with *Sirenites* n. sp., *Tropites, Juvavites, Juvavites?* cf. *carlottensis* (Whiteaves), *J.* (*Anatomites*) and *Gonionotites*. Much higher is a fauna which also appears to be of late Karnian age. It includes *Sirenites* n. sp., '*Palicites*', *Styrites* cf. *haugi* Gemmellaro, *Styrites* n. sp., *Juvavites mackenzii, J. mertoni, J. bococki*, J. (n. subg.?) n. sp., *J.* cf. *kellyi* Smith, *Gonionotites*? and *Griesbachites*. It is not possible to recognize the three foregoing faunas in all sections.

Yet higher is a fauna of Norian age with *Cyrtopleurites* cf. *bicrenatus* Hauer, *Cyrtopleurites* n. sp., *Pterotoceras* n. sp., *Drepanites, Placites*, and a species of *J.* (*Anatomites*) with ribbing like that of the *continui* group of *Juvavites*. Yet higher is a Norian fauna with *Sirenites* cf. *elegantiformis* Diener, *S.* n. sp., *Distichites* of both *megacanthi* and *compressi* groups, *Himavatites* cf. *watsoni* Diener, *H.* n. sp., *Helicitites* cf. *geniculatus* Hauer, *Hel*, n. sp., '*Heraclites*' cf. *ariciae* Mojsisovics, *Placites, Pinacoceras* of the group of *P. parma*?, *Phormedites, Parajuvavites, Isculites* cf. *decrescens* Hauer and *I.* cf. *smithi*,

Diener. *Oxytoma* cf. *alaskana* Smith occurs in the uppermost part of the range of the last fauna and the zone of *Monotis subcircularis* overlies the *Halobia* zone.

A small specimen of *Waldthausenites* was found in talus and comes from somewhere in the lower part of the *Halobia* zone. *Thisbites* occurs just below the range of *Distichites*.

Many of the above mentioned ammonoid genera have a wide range over the earth, including the Mediterranean, Indian, East Indian and American Pacific coast regions. Genera like *Juvavites, Anatomites, Tropites and Sirenites* have a wide distribution. *Malayites, Waldthausenites* and *Dimorphites* have been recorded from Mediterranean and East Indian localities, *Himavatites* from Indian and East Indian localities and *Helicites, Distichites* and *Cyrtopleurites* from Mediterranean, Indian and East Indian localities.

REVIEW

FUR-BEARING MAMMALS OF CALIFORNIA, THEIR NATURAL HISTORY, SYSTEMATIC STATUS, AND RELATIONS TO MAN. *By Joseph Grinnell, Joseph S. Dixon, and Jean M. Linsdale. Contribution from the Museum of Vertebrate Zoology, University of California. University of California Press. Berkeley. 1937. In two volumes, pp. xii, 777, figs. 345, plates 13. $15.00.*

The State of California ranks second in size among the States of the Union, its length from north to south about 780 miles, breadth varying from 150 to 350 miles, and its total area 158,297 square miles, of which 2,205 are water surface. The coast line is more than 1,000 miles long Mount Whitney, 14,502 feet, is the highest summit of the United States, excluding Alaska, while Death Valley reaches 480 feet below sea level, and Salton Sink 275 feet below sea level. California has the greatest variety of temperature and rainfall in the United States, with rich, broad alluvial valleys, snow-clad mountain tops, varied by desert valleys and the noblest forests and largest trees in the world. The animal life is accordingly varied, and the California fur-bearing fauna includes some form of nearly every genus found in the United States and representatives of most of the Canadian groups.

Out of some 460 species and subspecies of free-living mammals now known from California, 68 are dealt with as being properly "fur-bearers." The carnivora are by far the most important including the extremely valuable otters, fisher, martens, mink and foxes; the Rodentia, to which belong the beavers and muskrats, come next in importance; the Marsupialia, represented by the introduced opossum, and the Pinnipedia, containing the fur seals long vanished from the shores of California, are least important.

The three men whose names appear on the title pages of these volumes are thoroughly familiar with their broad subject with its many angles—historical, scientific, economic, and aesthetic. The senior author, Professor Joseph Grinnell, has been Director of the Museum of Vertebrate Zoology for many years, and has had field experience from Arctic Alaska to Lower California. Mr. Dixon has had only a few less years' field experience in the same field, both with the Museum of Vertebrate Zoology and later with the United States National Park Service, and Dr. Linsdale of the Museum of Vertebrate Zoology has also had extended experience with Western mammals, both from a field and systematic standpoint.

The two volumes are profusely illustrated, including thirteen full page colour plates showing nineteen species from originals by Major Allan Brooks, and 345 text figures, mostly from photographs, with some wash drawings in black and white by Major Brooks, and line drawings done chiefly by Mrs. Frieda L. Abernathy and Miss Anna Hamilton. Major Brooks is better known to the general public as a bird artist, as his drawings have had a wider circulation in that field, but the reproductions of his work in these volumes, as well as other examples of his work which the reviewer has been privileged to see, seem to place him at the head of illustrators of North American mammal life. The books are extremely well arranged, well printed in clear type on good paper, and the illustrations are well selected and reproduced in the best style of the printers' art.

These volumes have been based on the entire mass of material accumulated in the Museum of Vertebrate Zoology, consisting of skins, skulls, and other parts of the animals concerned, manuscript field notes, and correspondence covering a period of twenty-five years. The published literature has been searched, and experienced and reliable hunters and trappers of the State have been sought out and interviewed, and the records of the active California Fish and Game

Commission containing the reports of the licensed trappers of the State for several years have been made available. From the outset of the enterprise, Mr. Dixon went into the field as often as possible to run down records, to obtain first-hand information, specimens and photographs, and by meeting old-time trappers obtained a great mass of information which would otherwise have been lost, as some of the California mammals, notably all of the seven races of grizzly bear which were formerly found in the State, have become extinct within the memory of men now living, and a few others, as the southern wolverine and the fisher have become very rare in the State of California as well as in most other parts of the United States. As a result of Mr. Dixon's field laboratory work on the food of mammals, records of more than 2,500 stomach examinations of fur-bearers have been incorporated in this treatise.

Fur trapping and fur trading have gone through several phases in California, beginning before 1785, when the Spanish authorities first issued regulations governing the taking of sea otter skins. The Russians had worked south from Alaska by 1812 and the Russian-American Company continued operations independently until 1830 and under control of the Mexican government until 1841. In 1826 at least three parties of Americans arrived overland to trap beaver which were exceedingly abundant at that time, and trapping parties for the Hudson's Bay Company seem to have entered California from the north every year from 1828 to 1846 in search of beaver. Upon the discovery of gold in California, all of the trappers seem to have temporarily given up their interest in furs, but by that time the supply of fur animals had been so reduced that their former numbers were never completely recuperated. In the second half of the nineteenth century trapping was extended to the remaining and less conspicuous kinds of fur-bearers. By the end of the century the fur-bearing animals had become so reduced in numbers that an effort was made to save them from extinction.

The authors give two chapters which deserve attention, one on the effect of Mammals upon Man, and the other on The Effect of Man upon Mammals, and have handled the questions with impartiality. The carnivores that most often attack grazing animals are the coyote, wildcat, mountain lion, and black bear. Cultivated fruits may be eaten by coons, skunks, opossums, coyotes, gray foxes and bears. Irrigation ditches are often affected by muskrats and beavers, and the larger predators are continually blamed for interference with the hunters' privilege of killing game animals, and campaigns of elimination are carried on with more or less success from some points of view, but with seriously detrimental effects on other interests. Some species, as mountain lions, coons, skunks, wildcats, and coyotes show remarkable powers of environmental resistance under Californian conditions and can withstand heavy losses in numbers from varied causes.

The automobile and the great extension of roads into wilderness areas have opened new localities to trappers and made possible the use of longer trap lines. One man with a truck was able to run more than 100 settings and cover 50 or 60 miles daily, whereas previously the best he could do with horse and buggy was 30 to 40 settings and 15 to 20 miles a day. On the other hand, the advantages of the motor car to the trapper are offset to some degree by the expense of running the car, which eliminates small profits. Also, motor car trappers tend to stay near the roads. However, there are vast numbers of boys, farm hands, and others in rural communities who trap in a small way, and the aggregate of the catch is impressive, although the average income from trappers reporting was only approximately $160 annually. The most valuable catch over a period of years (1920-1924) was from striped skunk and coon, the fancy furs being too rare to add much to the figures.

The authors believe that the chief cause for depletion of fur-animal populations in many localities in California and expecially in the southern part of the State is poison put out for squirrels. As a rule, the fur animals die of secondary poisoning from eating the poison-killed small mammals, or of starvation caused by a too thorough removal of the smaller animals. The facts available show that where ground has been poisoned extensively and repeatedly, almost every animal upon which the fur-bearers depend for food is killed. In addition to the direct influence of poisoning operations on uncultivated ground, the heavy grazing of domestic stock which has been prevalent upon the mountain slopes has limited the production of furs from many wild areas by reducing the quantity of the annual growth of grasses and other plants, especially the seed-producing ones. The effects of overgrazing are intensified in years of unusual drouth. The authors consider that forest fires have burned up food supplies so that locally and temporarily populations of fur animals have been affected adversely, but that over long periods of time a large area will support larger populations of fur-bearers if the uniformity of the

vegetation has been broken, even by fire, than in a mature forest.

It goes without saying that these volumes contain a mine of information for any mammalogist or field ecologist. The technical descriptions are done in a workmanlike manner and the accounts of life histories or habits are fascinating reading. The work will also be indispensable to all who are interested in conservation and what is now known as "wild-life management." Nearly every species which can be classified as a "fur-bearer" has its "good points" and its "bad points," and discussions of these can be highly controversial, the heat of the arguments being as a rule inversely to the amount of factual knowledge possessed by the participants.

The larger number of the species are carnivorous and to a considerable extent predatory, and these habits bring them into direct conflict at times with stock-raising interests or with a certain type of sportsmen who believe that all kinds of "game" mammals or birds are sacrosanct and created for the especial benefit of human predators who ignore the widely spread value of the fur-bearers as a source of supplementary income to small farmers and ranchers who trap in their spare time, and the much greater value of the predatory species in removing diseased, unfit, or overcrowded game species in many areas, and their tremendous service in keeping down the hordes of rodent pests—gophers, ground squirrels, woodchucks, rabbits, and mice of numerous species—which devastate farm lands and grazing districts.

This work has been extremely successful in treating all these difficult questions in a judicial manner, and should be in the hands of every State and Provincial game board or commission, wildlife management teacher or student, sportsmens' organizations, college library, and every public library that can afford it. It is of especial interest to all Canadians who are interested in wildlife, as many parts of Canada are comparatively "new country," and it should be enlightening to read the history of the wildlife of California from early times to the present day, showing the effects of mining, ranching and farming, lumbering, and trapping, resulting in the downfall and unfortunate extinction of some species and the persistence of others in the face of civilization, and the measures which have been taken to preserve a wise balance between the diverse and complicated factors which affect the wildlife and its environment.—R.M.A.

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KIDD, H. M.,
Nordegg, Alberta.
KINDLE, C. H.,
Dept. of Geology,
City College,
New York, N.Y., U.S.A.
KINDLE, E. M.,
Geological Survey,
Ottawa, Ont.
KITTO, V.,
36 Patterson Ave.,
Ottawa, Ont.
KOMITETU PO ZAPOVEONIKAM,
Ulanskij Per D. 2 Pom. 74,
Moskva Centr, U.S.S.R.
KURATA, T. B.,
359 Ellis Park Road,
Toronto, Ont.

L

LAING, H. M.,
Comox, B.C.
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2321 Halifax Street,
Regina, Sask.
LANCELEY, W. H.,
23 Elmdale Avenue,
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City Health Department,
Winnipeg, Man.
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National Museum,
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P.O. Box 138,
Wetaskiwin, Alta.
LEIM, A. H.,
P.O. Box 254,
St. Andrews, N.B.
LEOPOLD, ALDO,
424 University Farm Place,
Madison, Wis., U.S.A.
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Dominion Bureau of Statistics,
Ottawa, Ont.,
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c-o National Parks Bureau,
Department of Mines & Resources,
Ottawa, Ont.
LLOYD, HOYES,
582 Mariposa Avenue,
Rockcliffe Park,
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582 Mariposa Avenue,
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50 St. Leonard's Avenue,
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569 Mariposa Avenue,
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RAWSON, D. S.,
Department of Biology,
University of Saskatchewan,
Saskatoon, Sask.
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Dept. of Zoology,
McGill University,
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International Salmon Commission,
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SASKATCHEWAN PROVINCIAL MUSEUM,
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240 Central Avenue,
London, Ont.
SCHUURMAN, J.,
Box 95,
Ottawa, Ont.
SCOTT, W. L.,
383 Stewart Street,
Ottawa, Ont.
SENN, H. A.,
Central Experimental Farm,
Division of Botany,
Ottawa, Ont.
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1002 Cambridge Avenue,
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827 Riverwood Ave.,
Fort Garry,
Winnipeg, Man.
SOUTHAM, W. M.,
Rockcliffe Park,
Ottawa, Ont.
SPEECHLY, H. M.,
232 Home St.
Winnipeg, Man.
SPEIRS, J. M.,
17 Wolfrey Avenue,
Toronto 6, Ont.
SPENCER, G. J.,
Department of Zoology,
University of British Columbia,
Vancouver, B.C.
SQUIRES, MRS. NATHAN C.,
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STANFIELD, R.
934 Dufferin Ave.,
London, Ont.
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67 Morton St.,
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Morningside College,
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Geological Survey,
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382 Spruce Street,
Winnipeg, Manitoba
STEWART, TOM,
165 Carling Ave.,
Ottawa, Ont.
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416 Queen St.,
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National Museum,
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Director of Fish Culture,
Room 206, Biological Building,
Montreal, P.Q.
TERRILL, LEWIS M.,
216 Redfern Avenue,
Westmount, P.Q.
THACKER, T. L.,
Little Mountain,
Hope, B.C.
THOMPSON, MRS. L. N.,
Harrington Harbour,
Saguenay County, Que.
THOMSON, M. M.,
Dominion Observatory,
Ottawa, Ont.
TORONTO FIELD-NATURALISTS' CLUB,
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Fort Saskatchewan, Alta.
TURNER, J. P.,
117 Cooper Street,
Ottawa, Ont.
TYRRELL, J. B.,
1312 Metropolitan Building,
Toronto 2, Ont.

U

URQUHART, F. A.,
Royal Ontario Museumof Zoology,
Toronto. Ont.
UTAH STATE AGRICULTURAL COLLEGE,
Forestry Dept.,
Logan, Utah, U.S.A.

V

VAN CLEAVE, H. J.,
Department of Zoology
University of Illinois,
Urbana, Ill., U.S.A.
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W

WALKINSHAW, L. H.,
1421-W Michigan Avenue,
Battle Creek, Michigan, U.S.A.
WALLACE, J. F. F.,
153 Acacia Avenue,
Rockcliffe Park,
Ottawa, Ont
WALSH, M. J.,
Box 133,
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30 Pretoria Ave.,
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University of British Columbia,
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Geological Survey,
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326 Metcalfe Street,
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THE CANADIAN FIELD-NATURALIST

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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The Canadian Field-Naturalist

VOL. LIII OTTAWA, CANADA, SEPTEMBER, 1939 No. 6

ARTHUR PHILEMON COLEMAN

1852 - 1939

Professor A. P. Coleman, who died in Toronto on February 26th, 1939, was a naturalist, artist, traveller and alpinist, as well as one of the world's greatest geologists.

Professor Coleman was born at Lachute, Quebec, on April 4, 1852, the son of Rev. Francis Coleman, a Methodist minister. On his mother's side, he was a descendant of John Quincy Adams, sixth President of the United States. He graduated from Victoria University, Cobourg, in 1876 as a Bachelor in Arts with the gold medal established by Queen Victoria for general proficiency. In 1881 he received the degree of Doctor of Philosophy from the University of Breslau, Germany. In 1882 Dr. Coleman was appointed Professor of Natural History in his Alma Mater. This position he held until Victoria moved to Toronto and became one of the federated colleges in the University of Toronto. In 1891 he was appointed Professor of Assaying and Metallurgy in the School of Practical Science and after ten years in this position was made Professor of Geology and head of the Department in the University, which position he held until he retired in 1922 at the age of seventy. From 1919 until his retirement, he served as Dean of the Faculty of Arts, and from 1914 as Director of the Royal Ontario Museum of Geology.

Although Dr. Coleman's early geological work was largely concerned with economic and Precambrian geology, he later became a world authority on glacial geology. His studies in this field led to the publication in 1926 of his book, *Ice Ages, Recent and Ancient.* His interpretation of the interglacial deposits at Toronto earned him world-wide recognition. In pursuit of evidences of glaciation in different parts of the world, he travelled widely and even after his eightieth birthday visited the high Andes in Colombia, the great mountains of southern Mexico and the hills and forests of Central America.

His love of mountains and mountain climbing is indicated by the title of another of his books, *The Canadian Rockies, New and Old Trails.* He was a past president of the Canadian Alpine Club: Mount Coleman in the Rockies was named for him.

Coleman was an artist of considerable merit, as attested by a large series of beautiful water-colours sketched in all parts of the world. A fine set of these illustrating geological features adorn the walls of the Royal Ontario Museum of Geology. He was one of the most popular of scientific lecturers, having the ability to express himself in words of simple beauty.

He loved every phase of nature, mountains, oceans, plains, woods and wild flowers. He was a tireless walker even in his last years and nothing delighted him more than to get out in spring in search of the first wild flowers. His interest in nature and his willingness to address meetings of naturalists was recognized by the Toronto Field Naturalists' Club in electing him as their Honorary President from the time the Club was organized until his death.

In Professor Coleman's death, Canada has lost not only a great scientist but one of her finest men.—J.R.D.

A LIST OF THE SPIDERS OF YORK COUNTY, ONTARIO, CANADA

By T. B. KURATA

THE SPIDERS of Ontario have received slight attention from naturalists. While Emerton's (1919) *A Catalogue of Canadian Spiders*, (Trans. Roy. Can. Inst. XII: 309—338), presents the more common species in a general fashion, no account of intensive collecting from any one area of Ontario has appeared. Hence the present county list, which is based upon collections contained in the Royal Ontario Museum of Zoology and made chiefly by the writer during the past ten years, may be of interest to other students. It is likely that nearly all the larger and more common types are herein mentioned. However, new records, particularly of the more minute forms, may be expected upon more thorough searching.

DESCRIPTION OF AREA

York County is situated in latitude 44°N and longitude 79°30′W. It lies within the Alleghanian of Merriam's Life Zones. Within its area of slightly less than 1000 square miles there is a moderate variety of habitats available. In general the region is flat farming country. The southern half of the county is elevated 600-700 feet above sea level: the northern half, slightly higher. The highest point is 1150 feet, in King Township. This county was one of the earliest in the province to be settled by Europeans. In consequence there is very little bush left. The wooded areas are chiefly restricted to the irregular morainic ridges and the Holland marsh of King Township, elsewhere to the creek valleys and farmer's wood lots. While there are only a few lakes, and these are small, contained within the boundaries, yet the county touches on two large lakes—Lake Simcoe on the north, Lake Ontario on the south. The Niagara escarpment, a striking feature of peninsular Ontario, does not come within our area, but passes to the northwest.

Stupart (1913) in *The Natural History of the Toronto Region*, published by the Canadian Institute, gives the following meteorological data from observations made at Toronto (*i.e.* southern York County) over a period of 71 years:

Mean Temperatures

Spring	41.0°F.	Annual	44.4°F.
Summer	65.8°F.	Minimum	36.3°F.
Autumn	47.5°F.	Maximum	52.6°F.
Winter	23.4°F.		

Mean Precipitation

Rain	27.86 in.	Mean Total 34.41 in.
Snow	65.5 in.	

EXPLANATION OF LIST

In the list the taxonomy is that given by Alexander Petrunkevitch, 1911), *A Synonymic Index—Catalogue of Spiders of North and Central and South America*. Amer. Mus. Nat. Hist. Bull. Vol. XXIX.

G—ground among leaf mould.

Sh—shrubs and small trees.

E—recorded by Emerton for York County.

VR—very rare.

R—rare.

NR—rather rare.

NC—uncommon.

C—common.

The localities are mentioned for the rarer species. In the case of the more common types, the number of different localities represented alone is mentioned. This will give a rough idea of the extent of the species.

ACKNOWLEDGEMENTS

The author owes much to the following specialists who kindly identified specimens for him: Mr. Nathan Banks, Museum of Comparative Zoology, Harvard College, Cambridge, Mass.; Dr. S. C. Bishop, University of Rochester, New York; Miss E. B. Bryant, Museum of Comparative Zoology, Harvard College, Cambridge, Mass.; the late Mr. J. H. Emerton; Prof. Wilton Ivie, University of Utah, Salt Lake City, Utah; Dr. W. J. Gertsch, American Museum of Natural History, New York; and to Mr. J. G. Oughton of the Royal Ontario Museum of Zoology for assistance in the preparation of the manuscript.

FAMILY ULOBORIDAE (Hackled-band Spiders)

Hyptiotes cavatus (Htz.).....Virginia, dead sh.....R

Uloborus americanus Walck.....2 loc. sh.....R

FAMILY DICTYNIDAE (Hackled-band Spiders)

Amaurobius bennetti (Blackw.).....7 loc. near the ground and roots and stumps of dead trees.....VC

Dictyna arundinaceoides Keys,	3 loc. sh.	R
D. brevitarsis Em.	2 loc. sh.	NC
D. foliacea (Htz.)	2 loc sh.	C
D. maxima Bks.	2 loc. sh.	R
D. semota G. I.	High Park, Toronto sh.	R
D. minuta Em.	Humber, Toronto, sh.	R
D. phylax Gersch and Ivie	4 loc. sh.	NC
D. sublata (Htz.)	6 loc. sh.	C
D. Volucripes Keys.	4 loc. sh.	C

FAMILY SICARIIDAE

Scytodes thoracica (Lat.)	Toronto, cellar	NC

FAMILY DRASSIDAE

Drassodes neglectus (Keys.)	Pottageville, G. and under loose bark of trees	C
D. robustus (Em.)	Pottageville, G.	C
Drassus hiemalis (Em.)	Pottageville, G.	C
Gnaphosa gigantea Keys.	Schomberg, G.	C
Herpyllus vasifer (Walck.)	3 loc. G.	C
Zelotes ater (Htz.)	Anchor Park, G.	C
Z. depressus (Em.)	Pottageville, G.	C
Z. putritanus Chamb.	Schomberg, G.	C

FAMILY THERIDIIDAE (Net-weavers)

Argyodes trigonum (Htz.)	Pottageville, sh.	R
Crustulina guttata (Wider)	2 loc. G.	C
Dipoena nigra (Em.)	Pottageville, G.	C
Enoplognatha marmorata (Htz.)	2 loc. G.	NC
E. rugosa Em.	High Park, Toronto G.	NR
Euryopis funebris (Htz.)	3 loc. Sh. and G.	NR
Pedanostethus riparius Keys.	2 loc. G.	NC
Steatoda borealis (Htz.)	9 loc. in corners of buildings and under loose objects on ground	C
S. bipunctata (Linn.)	High Park, Toronto C.	VR
Theridion differens Em.	12 loc. young often found in debris	C
Theridion frondeum Htz.	7 loc. sh.	C
T. kentuckyense Keys.	Pottageville, sh.	VR
T. lineatum (Cl.)	Westhill, sh.	VR
T. murarium Em.	12 loc. sh.	VC
T. sexpunctatum Em.	Elmhurst beach, sh.	VR
T. spirale Em.	7 loc. sh.	C
T. tepidariorum C. Koch.	Toronto, in cellar	VR
Theridula opulenta (Walck.)	Pottageville, sh.	VR

FAMILY LINYPHIIDAE (Net-weavers)

Bathyphantes brevis Em.	Wilcox Lake, G.	R
B. concolor (Reuss)	3 loc. G.	C
B. nigrius (Westering)	4 loc. G.	NC
B. pallidus Bks.	Queensville, G.	R
B. subalpinus Em.	Virginia, G.	R
B. zebra Em.	3 loc. G.	R
Ceratinella brunea Em.	3 loc. sh.	NR
Ceraticelus alticeps (Fox)	Pottageville, sh.	VR
C. emertoni (Camb.)	Pottageville, sh.	R
C. fissiceps (Camb.)	Pottageville, sh.	NC
Ceratinopsis alternata Em.	Ravenshoe, sh.	VR
C. nigriceps Em.	Pottageville, sh.	C
Diplocephalus cristatus (Blackw.)	2 loc. G.	VR
D. erigonoides (Em.)	Pottageville, sh.	VR
D. scopuliferus (Em.)	Humber, Toronto, G.	VR
Drapetisca alteranda Chambr.	Anchor Park, G.	VR
Erigone dentigera Camb.	Anchor Park, G.	VR
Gonatium rubens (Blackw.)	Humber, Toronto, G.	VR
Grammonota pictilis (Camb.)	4 loc. sh. and G.	C
Hypselistes florens (Camb.)	3 loc. sh.	NC
Lepthyphantes minutus (Blackw.)	3 loc. G.	R
L. nebulosus (Sund.)	3 loc. G.	R
Linyphia clathrata Sund.	3 loc. sh.	NC
L. communis Htz.	8 loc. sh.	C
L. conferta Htz.	High Park, Toronto, G.	VR
L. insignis Blackw.	8 loc. sh.	C
L. marginata C. Koch	7 loc. sh.	C

L. ontariensis Em.	2 loc. sh.	R
L. phrygiana C. Koch	10 loc. sh.	VC
L. pusilla Sund.	3 loc. sh.	NC
Microneta quinquedentata Em.	Toronto, G.	VR
M. unimaculatus Bks.	Elmhurst beach, G.	VR
M. viaria (Blackw.)	Ravenshoe, G.	VR
Oedothorax plumosus (Em.)	Humber, Toronto, G.	R
O. terrestris (Em.)	Humber, Toronto, G.	R
Prosopotheca communis (Em.)	High Park, Toronto, G.	R
P. directs (Camb.)	Humber, Toronto, G.	R

FAMILY ARGIOPIDAE (Orb-weavers)

Araneus angulatus Cl.	5 loc. sh.	VC
A. arabesca (Walck.)	5 loc. sh.	VC
A. cavaticus (Keys.)	2 loc. sh.	NC
A. cornutus Cl.	5 loc. sh.	C
A. cucurbitinus Cl.	11 loc. sh.	VC
A. marmoreus Cl.	5 loc. sh.	C
A. patagiatus Cl.	4 loc. sh.	C
A. sericatus Cl.	3 loc. sh.	C
A. trifolium (Htz.)	7 loc. sh.	C
Argiope aurantia Lucas	9 loc. among grass and low shrubs	C
A. trifasciata (Forskal)	3 loc. sh.	C
Cyclosa bifurcata (Walck.)	5 loc. dark places in wood	NC
C. conica (Pallas)	7 loc. sh.	C
Eucta lacerta (Walck.)	Ravenshoe, tall grass in shade	NC
E. vermiformis (Em.)	2 loc. sh.	NC
Eugnatha straminea (Em.)	Pottageville near marsh	NC
Eustala anastera (Walck.)	13 loc. sh	C
Leucauge venusta (Walck.)	Leaside, Toronto	NC
Mangora placida (Htz.)	3 loc. sh.	NC
Pachygnatha brevis Keys.	High Park, Toronto, sh.	NC
Tetragnatha elongata Walck.	2 loc. sh.	NC
T. extensa (Linn.)	6 loc. sh.	VC
T. laboriosa Htz.	Pottageville, sh.	NC
Theriodiosoma gemmosum (L. Koch)	Leaside, Toronto, G.	VR

FAMILY MIMETIDAE (Orb-weavers)

Mimetus interfector Htz.	Pottageville, sh.	R

FAMILY THOMISIDAE (Crab or Sidewise Running Spiders)

Misumena vatia (Cl.)	13 loc. among flowers and in shrubs	VC
Misumenops oblongus (Keys.)	5 loc. sh.	NC
Philodromus aureolus (Cl.)	17 loc. sh.	VC
P. exilis Bks.	Mount Dennis, sh.	R
P. ornatus Bks.	6 loc. sh.	NC
P. pernix Blackw.	7 loc. sh.	C
P. rufus Walck.	8 loc. sh.	C
Synaema bicolor Keys.	Brownshill, G.	R
Tibellus duttoni Htz.	4 loc sh.	C
T. oblongus (Walck.)	1 loc. sh.	C
Tmarus angulatus (Walck.)	3 loc. sh.	NC
Xysticus brunneus Bks.	Toronto, G.	R
X. ferox (Htz.)	2 loc. G.	NC
E. X. gulosus Keys.	Toronto, G.	R
X. versicolor (Keys.)	Toronto, G.	NC

FAMILY CLUBIONIDAE (Tube-weavers)

Agroeca pratensis Em.	High Park, Toronto, G.	R
A. saltabunda (Hts.)	Humber, Toronto, G.	VR
Castianeira cingulata (C. Koch)	Pottageville, G.	NC
Clubiona abboti L. Koch	6 loc. sh	C
C. canadensis Em.	2 loc. sh.	C
C. minutissima Peter	High Park, Toronto, sh.	VR
C. obesa Htz.	Virginia, sh.	NC
C. riparia L. Koch	3 loc. sh.	C
C spiralis Em.	Toronto, sh.	R
Micaria aurata (Htz.)	High park, Toronto under loose objects on the ground	R
M. gentilis Bks.	3 loc. G.	NR
Phrurolithus alarius (Htz.)	2 loc. G.	C

FAMILY AGELENIDAE (Tube-weavers)

Agelena naevia Walck.	11 loc. Toronto, near ground on shrubs and grass in meadow and in wood	VC
Antistea riparia (Keys.)	Leaside, Toronto, G.	NC
Cicurina arcuata Keys.	4 loc. G.	C
C. brevis (Em.)	High Park, Toronto, G.	NC
C. pallida Keys.	4 loc. G.	C
Cœlotes fidelis Bks.	5 loc. under debris on ground and under bark of trees	C
C. montanus Em.	2 loc. G.	NC
C. calcaratus (Em)	Pottageville, G.	VR
Coras medicinalis (Htz.)	3 loc. hollow trees, crevices in rocks and also in angles of wood	NC
Cryphoeca montana Em.	Leaside, Toronto, debris	NC
Hahnia agilis Keys	2 loc.	C
H. brunnea Em.	Elmhurst beach	NC
H. cinerea Em.	Anchor Park	C

FAMILY PISURIDAE (Nursery-Web Weavers)

Dolomedes tenebrosus Htz.	3 loc. sh. and G. near water	C
D. Triton (Walck.)	2 loc. G.	C
Pisaurina mira (Walck.)	Pottageville, sh.	NC

FAMILY LYCOSIDAE (Running Spiders)

Arctosa cinerea (Fabricius)	Ballantrae, G.	NC
Geolycosa fatifera (Htz.)	High Park, Toronto, G. burrows	R
Lycosa avida Walck.	4 loc. G.	NC
L. baltimoriana (Keys.)	High Park, Toronto, G. burrows	R
L. frondicola Em.	Pottageville, G.	NC
L. helluo Walck.	4 loc. G.	C
L. pratensis Em.	6 loc. G.	C
Pardosa distincta (Blackw.)	Schomberg, G.	NC
E. P. emertoni Chamber.	Toronto, G.	NC
P. lapidicina Em.	4 loc. G.	C
P. milvina (Htz.)	Elmhurst, beach, G.	R.
P. modica (Blackw.)	3 loc. G.	NC
P. moesta Bks.	3 loc. G.	C
P. saxatilis (Htz.)	Toronto, G.	R
P. sternalis (Thorell)	Elmhurst beach, G.	R
P. xerampelina (Keys.)	6 loc. G.	VC
Pirata arenicola Em.	2 loc. G.	C
P. insularis Em.	3 loc. G.	C
P. marxi Stone	Elmhurst beach, G.	R
P. minutus Em.	Elmhurst beach, G.	NC
P. montanoides Bks.	Elmhurst beach, G.	NC
Shizocosa crassipalpis (Em.)	2 loc. G.	R

FAMILY SALTICIDAE (Jumping Spiders)

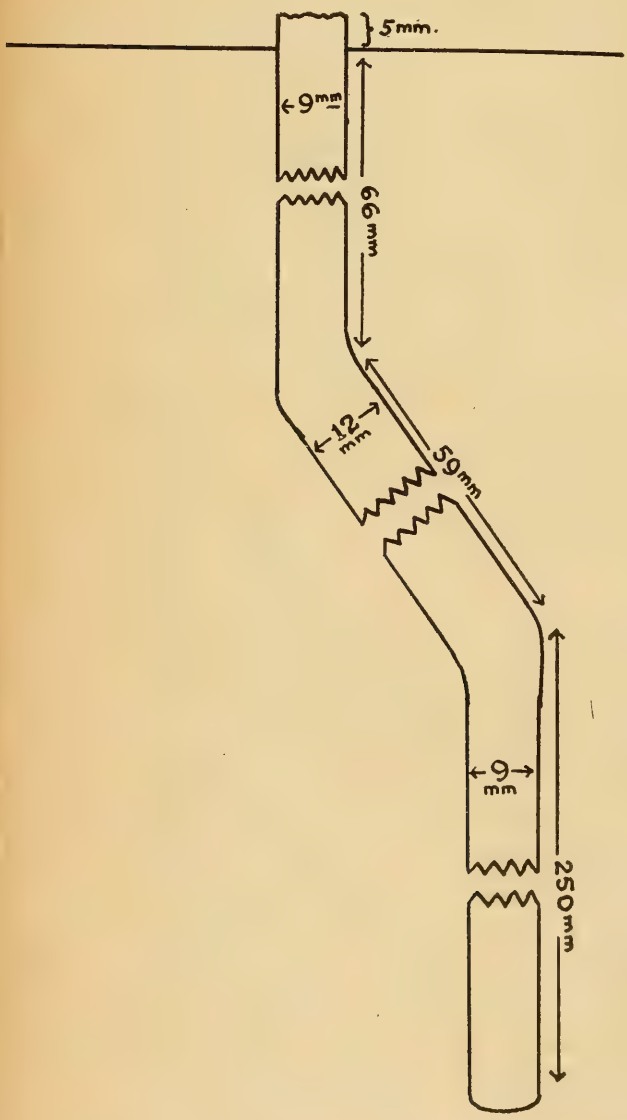
Admestina tibialis (C. Koch)	Anchor Park, sh.	R
Chalcoscirtus montanus (Bks.)	Elmhurst beach, sh.	NC
Dendryphantes (Metaphiddipus) capitatus (Htz.)	2 loc. sh.	C
D. (Dendryphantes) flavipedes Peckham	4 loc sh.	C
D. (Paraphidippus) marginatus (Walck.)	11 loc. sh.	VC
D. (Phidippus) purpuratus (Keys.)	4 loc. G. loose bark of trees	C
Evarcha hoyi(Peckham)	5 loc. sh.	C
Evophrys monadnock Em.	Anchor Park, G.	VR
Habrocestum pulex (Htz.)	4 loc. G.	C
Icius hartii Em.	Elmhurst beach, sh.	VR
Maevia vittata (Htz.)	2 loc. sh. debris	NC
Neonnellii Peckham	Anchor Park, Sh.	R
Peckhamia americana (Peckham)	Toronto, G.	R
Pellenes decorus (Blackw.)	2 loc. sh	R
Phiddipus viridepes (Htz.)	Sharon, sh.	VR
P. altanus G.	Bellhaven, G	VR
Sitticus palustris (Peckham)	Virginia, sh.	R
Tutelina elegans (Htz.)	Pottageville, G. debris	NC

OBSERVATIONS ON THE BURROWING WOLF SPIDER
Lycosa missouriensis Bks.

By T. B. KURATA

THE FAMILY of wolf spiders (*Lycosidae*) contains a number of burrowing species of which *Lycosa missouriensis* is rather common in suitable situations in southern Ontario.

In mid-October of 1930 my young son discovered the turrets of *Lycosa missouriensis* in High Park, Toronto. We found that the whole sunny west slope was occupied by this kind of spider.



We then started to trace out the burrows. Since we soon found that the shaft was not vertical throughout its entire course, we inserted a large blade of grass, and with this guide we dug out a complete burrow easily.

THE BURROW

The dimensions of the tunnel varied somewhat according to the size and age of the spider. However, the figures which follow are averages of 10 measurements: first there is a turret 5 mm. high and 9 mm. bore. This leads into a vertical shaft 66 mm. deep Next the burrow deflects for 59 mm. through about 30° and its diameter increases to 12 mm. Thereupon it deflects back through about 30°, becoming vertical. This last vertical shaft has the small bore (9 mm.) and is 250 mm. deep. The entire burrow is lined with silk. This serves two functions—a cement for the walls of the tunnel and a ladder for the inhabitant The turret consists of a few blades of grass or small sticks or other debris cemented together.

The turret is a lookout point for the spider when she is awaiting her prey. It also prevents some surface water from draining into her home. The enlarged part of her burrow is her living room. Here she must come to turn around since the small-bore tunnels fit her snugly and prevent any twisting.

In digging, the spider employs her fangs as the tool. She transports the loose sand in an ingenious fashion. She spins some viscid silk web. The sand grains adhere to this web. When some has accumulated, she seizes her load, which looks like a pill 5 or 6 mm. diameter, in her fangs and carries it out well beyond her entrance.

LIFE CYCLE

The mature female opens her burrow in the early part of May by removing the winter door at the top. Soon she lays her eggs into an egg-sac, made of silk from her own spinnerets. This egg-sac she carries attached to her abdomen until the young spiders are hatched. On sunny days in June and July the mother brings her egg-sac to the entrance of the turret, and with her two front pairs of legs rotates it in the sun. In this way every part of the egg-sac is warmed.

The eggs are hatched in July and the young spiders climb on their mother's back where they

remain for a considerable time, until, in fact, they are able to forage for themselves.

The mother, her duties finished, soon dies. The young spiders dig into the ground, and hunt for food, occasionally enlarging their dwellings as the need arises. In late October when the leaves fall, they cement a bit of leaf to the opening and hibernate until next spring. In May, they open their burrows, hunt and grow all summer.

They mature by late August or early September and soon mate. The impregnated female lives on, and hibernates for the winter. The unfortunate male soon perishes. The female, in the following May lays her eggs and starts the cycle anew.

Feeding Habits

I have never actually watched one of these spiders catch her prey but it has been observed by the late Mr. Emerton. The spider comes to the turret, and bending her two front pairs of legs under her, waits for an insect to come within her reach. Thereupon she pounces upon her prey.

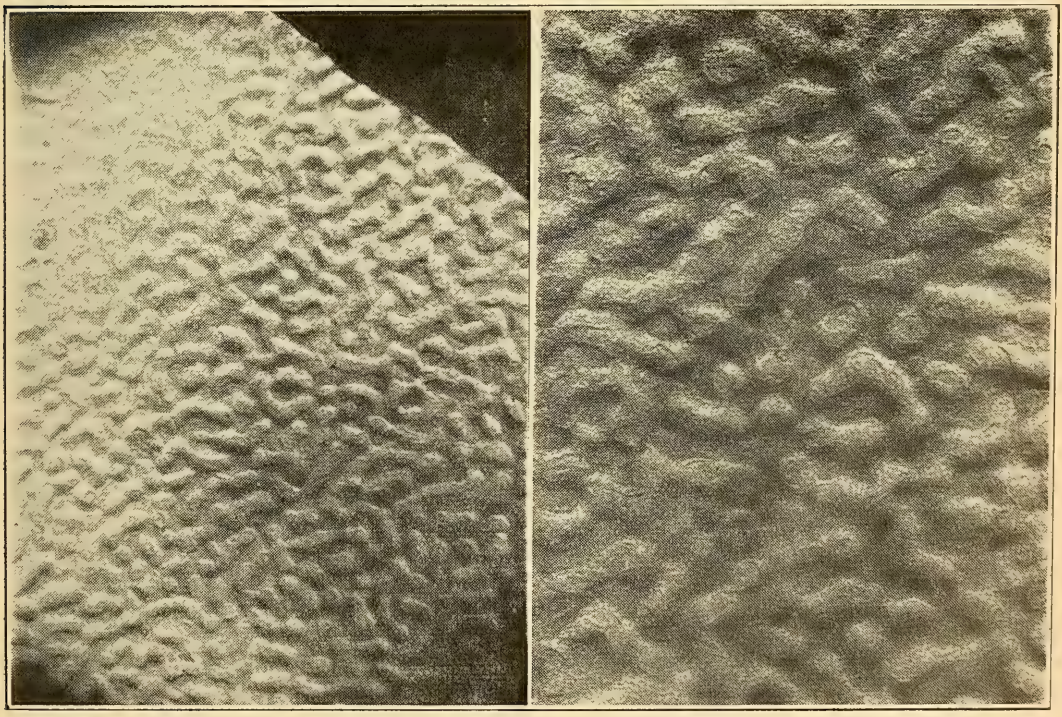
A NOTE ON WAVE MARKINGS IN THE DUNDAS FORMATION AT TORONTO

By V. J. OKULITCH

Department of Geology, University of Toronto.

A SLAB of limestone, showing a peculiar pattern of markings, was collected by the author in the Dundas formation exposed in the Don brickyard quarry at Toronto.

A search made through the available literature seems to indicate that small ripple marks in limestone are very rare. It is, therefore, felt that a note on occurrence of very small ripple marks in one of the "hard beds" of the Dundas formation is not out of place. The author feels very much obliged to Dr. E. M. Kindle of the Geological Survey of Canada for several valuable suggestions in connection with ripple



marks, and to Dr. M. Fritz, Dept. of Geology, University of Toronto, with whom the origin of the markings was discussed. It is desirable to state first that although for convenience of description the term "ripple mark" is employed, there is no certainty as to the true character of the markings.

A description of the markings follows. The ripples have a wave-length of 5 to 7 mm. and an amplitude of only 0.5 to 1.5 mm. and are therefore unusually small. The upper surface of the slab has suffered some erosion and post depositional compaction, so that the amplitude was originally greater, but probably not greater than 2 mm. The pattern, as shown by the photographs is very irregular, suggesting ripples made in very shallow water by indefinite oscillatory movement of the water. Some of the ripples appear to be symmetrical, while others show gentler slopes on one side than on the other. It would appear that several sets of ripples, crossing each other in several directions, are present. It is quite obvious that even if the markings are true ripple marks, which is not by any means certain, they are not the simple current type, nor the symmetrical wave type.

E. M. Kindle ([1]) in his admirable paper on the "Recent and Fossil Ripple Marks" has described the interference type of ripple marks (pp. 34-36) giving illustrations of several kinds, on plates 22, 23, and 30, and a symmetrical ripple mark with saucer-shaped depressions in the troughs, on plate 32B. It is likely that the markings under discussion belong to this class of ripples.

Sir Charles Lyell ([2]) describing the formation of ripple marks, says: "The restoration (of ripple marks) began by the appearance here and there of small detached heaps of sand, which soon lengthened and joined together, so as to form long sinuous ridges...." This description suggests the possibility that the ripples found in the Dundas might be in their incipient stages, which would explain their peculiar appearance and small size.

The appearance of the ripples is so unusual that some doubt is felt whether the structure is in reality a wave or current marking. Several possibilities are suggested. The markings may have been formed, as suggested before, by interference of several sets of wave ripple marks; by organic action, such as the burrowing activities of some marine invertebrates modified by wave or current action, or the influence of spreading sea weeds on formation of the ripples; by rain drops; or by differential settling of the surface of the unconsolidated sediment.

The last mentioned possibility is the least probable, as the pattern is too regular, and consists of shallow troughs and ridges. The general appearance of the rock, the presence of numerous marine fossils in associated layers and the fact that the depressions and ridges are relatively long, precludes, in my opinion, the possibility that the markings were made by rain drops. We are then left with either the organic or inorganic interpretation. Of the two it seems more plausible that the markings are a peculiar type of interference ripple mark.

The possibility exists, as suggested by Parks ([3]) that the lenses of limestone, or calcareous shale, in the Dundas formation are not true limestone beds, but rather are concretionary in character, representing lenses of shaly or silty material later enriched in calcium carbonate. Should this be the case, the ripples were formed on muddy or silty bottom, and only later turned to limestone.

The slab is deposited in the Royal Ontario Museum of Geology.

REFERENCES

1. E. M. KINDLE, *Recent and Fossil Ripple Marks*, Museum Bulletin No. 25, Geological Survey, Canada, 1917.
2. Sir CHARLES LYELL, *Elements of Geology*, 6th ed., pp. 41-43. 1841.
3. W. A. PARKS, *The Stratigraphy and Palaeontology of Toronto and Vicinity, p. 89*, Ontario Dept. of Mines, vol. 32, pt. 7, 1923.

ILLUSTRATIONS

Fig. 1a. Problematic structure, possibly representing interference ripple mark. x ½

Fig. 1b. Problematic structure, possibly representing interference ripple mark. x 1½

THE CHUKAR PARTRIDGE IN THE PRAIRIE PROVINCES

By J. DEWEY SOPER

THE ADDITION of a new game bird to the avifauna of a country is somewhat of an event. Success or failure depends on several factors, some of which are of vital importance whether recognized early or late. The initial struggle for survival on the part of the introduced form is naturally watched with keen interest. To attempt to establish exotic species in Western Canada is not a new venture and possibilities continue to intrigue. The latest experiment of this kind involves the Chukar Partridge (*Alectoris graeca chukar*), which belongs to a group known as the red-legged partridges of the family *Perdicinae*.

The natural range of this race covers a large area in central Asia, including Tibet, Mongolia, Turkestan, northern India and Persia. It appears to be especially associated with the Karakoram Mountains of Kashmir and the Himalayas. Locally occupied habitats are widely diversified in character, embracing shrubby, open woods at one extreme, to sections of marked desolation at the other.

Altitudinal distribution extends from sea-level as along the Gulf of Persia, up to about 14,000 feet as in the Himalayan Mountains. In one place it endures a noonday temperature of 150° F., in another, cold at daybreak well below the zero mark. Again, it haunts sun-baked deserts as well as districts with considerable rainfall. Typically, however, the birds are residents of dry or moderately dry country, with a partiality for open, rocky hillsides with little or no vegetal cover. The species feeds on grain, roots, seeds, berries and a variety of insects.

From the foregoing, it is apparent that the Chukar Partridge is extremely hardy in its native environment. Because of age-old habituation to wide variation in temperature and humidity, it is calculated to be well adapted to the climatic and physical conditions of the Prairie Provinces. Time and experiment only will show whether this supposition is correct or not.

The idea behind the Chukar's introduction on the Canadian plains is to eventually provide another game bird for the recreation of western sportsmen. This is not only to supplement, but to relieve the drain on native grouse. For a similar reason the European, or Hungarian Partridge (*Perdix p. perdix*), was earlier released in the Prairie Provinces. The conviction is held by some that the Chukar Partridge will finally prove to be even hardier and better adapted to the region than *Perdix*.

To Major W J. S. Walker, Calgary, Alberta, I am indebted for the following information: On September 28, 1937, Mr. Fred J. Green, of the Calgary Fish and Game Association, was instrumental in liberating the first Chukar Partridges in Canada. In this consignment there were approximately 200 birds, all of which were set free on the ranch of Mr. Dan Patton near Midnapore, nine miles southwest of Calgary.

At Baintree, some 35 miles northeast of Calgary, a smaller lot was liberated in 1938. Some encouraging reports have been received regarding these birds and from present indications it appears likely that they will become firmly established. Propagation on a small scale was attempted in Inglewood Bird Sanctuary, Calgary, with slim results. In April, 1939, it is expected that about 400 additional Chukars will be purchased at outside points and released in small groups in probably twenty localities in southern Alberta.

These earliest experiments were soon followed by others of a somewhat different character farther north. Details regarding these have been kindly supplied by Mr. W. H. Wallace, Fish and Game Commissioner for Alberta. In April, 1938, the Northern Alberta Fish and Game Association purchased 108 Chukar eggs from a game farm in Wisconsin. Out of this number 95 hatched. Incubation was carried out by the Provincial Poultry Farm at Oliver, Alberta. Delivery of the chicks was taken by the game association mentioned in June, 1938, and were then distributed for rearing to the farms of four co-operators in the Edmonton district. Up to the spring of 1939 there were many casualties among the 90 birds originally delivered. In one instance about half of the group died. The present intention is to release the remaining birds, in the summer of 1939, after they have matured and produced eggs in captivity.

According to information received from several sources in the West, considerable difficulty has been experienced in raising Chukar Partridges in captivity. The birds proved to be extremely nervous and spent much of their time fighting the wire netting in an effort to escape. Many

individuals even broke their necks by frantically flying into the fences. Certain pen-rearing ventures in Western Canada are known to have ended in almost complete failure, while others, again, have been successful. Individual or group temperament in captivity appears to be markedly variable in character.

Experiments conducted by Mr. D. H. Bendick, Grathside Game Farm, Leduc, Alberta, have been very encouraging. In a letter of April 3, 1939, he states that the Chukar Partridge has been reared there successfully, that it is very easy to handle and takes kindly to captivity. In the pens it has been found much less wild than the Hungarian, though fully as furtive and excitable after liberation. The Chukar breeds freely in confinement and produces a high percentage of fertile eggs. One hen will lay as many as 60 eggs in a season, but clutches last delivered are too late to be of use in the Alberta climate.

The chicks are said bo be easily reared and soon become very tame. When mating and nesting the following spring their habits are more secretive; at this time they normally retire to brushy tracts for concealment. When the broods are nearly full grown, however, they often return to the original surroundings where safety is assured. Like the Hungarian, the Chukar Partridge is monogamous. The male assists in incubation and if accident claims the female he will hatch and rear the young himself. Mr. Bendick mentions that these birds are extremely hardy. Twice during the winter of 1938-39 there were spells of 50° below zero weather which they endured with apparent enjoyment while completely ignoring available shelter for the night.

Mr. A. G. Cunningham, Director of Game and Fisheries for Manitoba, has informed me that his branch has been experimenting with Chukar Partridges since the year 1935. Reasonably good success has been experienced. During the winter of 1937-38 about 130 birds were carried over. In May, 1938, 44 Chukars of both sexes were released at four different points within the province. The remainder were retained for egg-laying purposes and then liberated in the fall. In the spring of 1939, a little over 100 adult birds were in captivity, which were hatched during the summer of 1938. Some of these will be set free in the spring of 1939. According to reports, the birds which were released during the spring and fall of 1938 withstood the succeeding winter with very little mortality.

Information regarding Saskatchewan introductions had been kindly provided by Mr. E. S. Forsyth, Game Commissioner for that province. The first Chukar eggs were secured in 1937. These were hatched under the direct supervision of Mr. E. Howie at the Mental Hospital, Battleford, and Mr. T. Grice, caretaker of the Wild Animal Park, Moose Jaw. Fair success followed at the former point when 35 birds from 50 eggs were raised to maturity. Apparently as the result of faulty incubation, the Moose Jaw experiment was less encouraging with the production of only 10 or 12 birds from the same number of eggs. The next spring some of the Battleford birds were released in the Mental Hospital Game Preserve and there is definite knowledge that at least one covey was successfully produced that season in a wild state.

In the spring of 1938 Saskatchewan Game Branch decided to go further into the matter of raising Chukars and established a game farm for the purpose at Beaver Creek, near Saskatoon. Some 400 eggs were purchased by the Provincial Government and a number by private individuals. Though hatching results were very favourable, many of the young birds died before reaching maturity. With the determination to succeed, the Game Branch is following up experiments by securing more eggs for the season of 1939. It is thought that this species should adapt itself to Saskatchewan conditions as readily as did the Hungarian Partridge and, if so, that it will prove to be a very valuable asset to Western Canada.

*THE ROLE OF THE PREDATOR**

By P. A. TAVERNER

* Presented at the Convention of the Federation of Ontario Naturalists, Toronto, January 28th, 1939.

THE BATTLE of wild life conservation is being fought. All forces are united as to the necessity of safe-guarding our natural heritage, but each school of thought advances its own panacea and the forces of good intention find divisions in their ranks that nullify much of their efforts. Nowhere is this more evident than in the opposed attitudes of different blocks towards the subject of predation. One group argues vehemently that

every creature saved from the claws and jaws of natural raptors is one more that can be devoted to man's use or to the prosperity of the favoured species. The other postulates that the predator is a normal and necessary factor in the economy of nature and its elimination would be disastrous to the end in view. The school that regards itself as being "common sense" and "practical", views its opponent as doctrinaire, theoretical and sentimental; the other school prides itself on its scientific caution, its wider field of vision and more exact knowledge of biological reaction.

Wild-life management is not far removed from domestic stock breeding, the fundamentals are the same and the same basic laws hold good for both. In one the proceedings are fairly well understood and systematized, and it requires only the transference of its proved principles to the other to produce similar effects.

Under optimum conditions all life increases in a geometrical ratio. If the process went on indefinitely without hindrance, shortly there would not be room in creation for all the living beings. This is true of all life, wild or domestic. —flies, mice, lions and elephants. That this result does not occur is proof that of those born, a large proportion is inevitably doomed to early death. The agencies that bring this about are various but absolutely certain. They may be, limitations of food supply, climatic conditions, predators, disease or other unsuspected factors. We can recognize a number of them but their relative importance, either alone or in combination is, in many cases, too complicated for ready analysis. We do know, however, that under any given set of conditions, there is an optimum of population, the resultant of many plus and minus factors, beyond which numbers can not be maintained.

This is axiomatic to the stock-raiser who must keep his herds or flocks down to the supporting limits of his land and equipment. He must limit his stock to the number his acreage will support throughout the season and that can be sheltered against the severest inclemencies likely to be experienced. Increase beyond this definite number must be disposed of in one way or another or else the welfare of the whole will be endangered, for it is not only the over-stock that is affected by over population; but the entire association, all creatures directly involved and the land they occupy. The latter becomes exhausted and its carrying capacity is lowered. Upon the excess population that must be removed, the stockman relies for his subsistance-profit. In its removal he becomes the predator and, having carefully controlled other depopulation factors, makes his predation the ultimate and critical one.

This is strictly comparable to wild-life conditions where the production exceeds the supporting and protecting powers of the environments. The surplus must be weeded out, if not by one cause, then by another. If one control is reduced, another takes its place; if none other is active, predation assumes major proportions. When all normal controls fail, disease is almost certain to step in. In the case of predation a nice adjustment of balance of forces is evident. Potential predation in one form or another is almost always present in nature; there are always hungry things looking for food. When a species is scarce, predation is ordinarily a passive factor; when the species becomes common, predation increases. When, through the reduction of other factors, the species becomes over-abundant, predation may assume major proportions. Thus over-predation is usually an indication of over-production in relation to the environment.

The familiar argument enters here. Why, with our wild-life should we not replace natural with human predation as is done in domestic over-production? Why not eliminate the natural predators and take their share for our own use? Instead of supporting, hawks, owls, etc., why not let us have the over-plus? Superficially this sounds so logical that it is small wonder that it is regarded as indisputable. The facts, however, are that natural predation and that of the stock-man are essentially different from that of the sportsman. The stock-raiser in eliminating his supernumerary animals carefully takes the least promising of his stock. The natural predator by unconscious selection captures, on the average, the weaklings and least efficient. Thus both help to build up the constitutional stamina and resistance of the residue by the elimination of the unfit. The sportsman on the contrary, endeavours to take the best of the hunted,—the largest goose, the highest plumaged bird, the deer with the greatest antlers or the biggest and finest bear, leaving the culls to perpetuate the species. Even where no conscious discrimination is used and he takes the run of species, the bad with the good, his effect is not genetically constructive. Wherever he makes choice the effect is destructive; his average is either nil or detrimental, never beneficial.

Superficially it may seem that the killing of individuals for the good of the race is rather a paradox; yet that is just what the experienced stockman finds necessary if he is to keep up or

build up the standards of his herd. It is just as important for him to dispose of scrubs, weaklings and the diseased as it is to acquire good stock. The best of herds will, eventually, deteriorate if careful elimination is not practised; all the more rapidly if the best, not the poorest, of the stock is eliminated. The strongest wild strains would also similarly degenerate were it not for a selective pressure from natural enemies; a pressure the sportsman exerts in an opposite direction. The natural predator is a strengthening element in wild-life economy, the sportsman a weakening one and it is questionable whether any compensation that he initiates makes up for his degenerating influence.

It is granted that under certain circumstances of time, place and conditions, predation may be too heavy for some species to withstand. This is practically always the result of an unbalance in environment in relation to population. All species have evolved under certain stresses of releases. Had predation not been compensated for by other factors, this or that form could never have developed. Threatened by their enemies, species learned how to make use of their environment and develop powers to guard against them. Thompson Seton has said that every species has some great advantage or else it could not exist; that every species has some great weakness or no other animal could survive. Under natural conditions and generations of adaptations the strength of one is compensated for by the weakness of the other. The fact that few animals through ages of evolution have entirely freed themselves from individual fear of raptors is highly suggestive that predation is an important condition of racial success and that without it progress would have been tremendously slowed or impossible. Without the wolf at his heels, the horse would never have developed or retained its fleetness and without the hawk the partridge would not have obtained its camouflage. The principle works today just as it has in times past.

One of the principal mechanisms of predator-defense is shelter to which to flee in moments of danger or in which to rest or to raise young in comparative safety. Where this is absent in pratical proximity to fields of normal endeavour, such as feeding grounds, a species is under a heavy handicap to its enemies. Burn, reap, or graze away all the long grass, drown or drain the reed beds, level the forest, clear away all the brush and tangle while restricting necessary food supply to exposure, and decimation or worse is likely to prevail against the species adapted to them. Given adequate shelter and the normally strong of any species can take care of itself against its hereditary foes. As for the weaklings, it is better to let them go. The problem in such cases of unbalanced environment is not the raising more unprotected stock to feed carnivores but in restoring favourable habitat against them, thus retaining the necessary services of the predators under circumstances that increase the favourableness of their selection.

Another moot question often brought up by a limited and special clientele is that of artificially produced over-plus populations. Wherever there is unprotected food in abundance there we can expect an influx of predators to consume it. They may be cats or rats or skunks or hawks or parasites, but if you bait a place you can expect the baited to come. Some of these as cats and rats and other camp-followers of man are just as artificial to the natural scheme as is the congestion that attracts them. These are foreign hazards, cannot plead as natural predators and are without the pale of this article, but even forms that are normally inocuous, in the presence of easy prey, may develop unsuspected food habits. All animals take, within the limits of acceptibility, the food that is easily obtainable and are no more inclined to overexert themselves in winning their daily bread than is man. Thus on game farms, fish hatchery pools and other artificial concentrations we may expect unusual and perhaps serious predation. It is another example of an over-loaded environment. The game-keeper or fish-keeper can be expected to protect his charges, but should he do so by wholesale destruction of forms that are of value to the broader, more numerous interests of the community at large? We should certainly expect him to devise methods that would not penalize the whole country for the sake of his individual interest. The cost of protection under these restrictions may be considerable, even perhaps at times greater than the project can economically carry but, after all, he who would raise oranges in the Arctic must consider the cost of glass houses before he proceeds with his venture.

The conclusion seems plain that the predator occupies an essential position in the scheme of nature that cannot be replaced by any other agency: that probably one of the greatest disservices man can do for the game he hunts is to destroy his rivals, the predators, the agents that exercise the only selection that compensates for his own deteriorating influence.

COD X HADDOCK HYBRIDS?

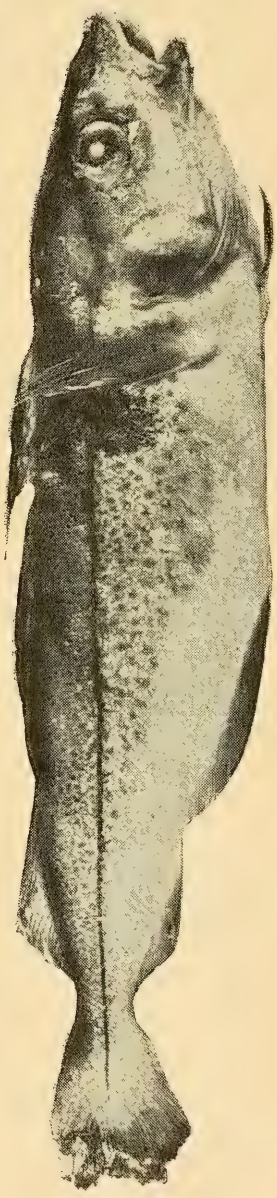
By J. R. DYMOND

TWO SPECIMENS suspected of being Cod x Haddock hybrids were submitted to the Royal Ontario Museum of Zoology through Dr. A. G. Huntsman in March, 1938. These specimens were received by F. T. James Co. Ltd. of Toronto from Lockeport, Nova Scotia, and were taken by boats fishing in the Atlantic out from Lockeport.

The principal distinctions between the cod and haddock are that the haddock has (1) a much more protruding upper jaw, (2) smaller mouth, (3) a much higher first dorsal, the anterior rays of which are considerably produced, (4) a more lunate caudal fin, (5) great enlargement of hypocoracoid, (6) supraoccipital crest considerably developed, and (7) a black lateral line and black humeral spot. Moreover the backs and sides of the cod are marked with numerous rounded brownish spots which are lacking in the haddock.

One of the specimens lacked the head and the other lacked the caudal fin. Both specimens had the black lateral line and humeral spot of the haddock but the spotting on the back and sides of the cod. The upper jaw protruded as in the haddock but, when measured from the tip of the snout to the posterior end of the upper jaw, it was intermediate between cod and haddock. The first dorsal fins of the two specimens were produced in front as in the haddock but their height was not nearly as great as in the haddock. The caudal fin of the specimen possessing a caudal was lunate. The hypocoracoid was enlarged and the supra-occipital crest developed as in the haddock but not to the same extent. Since the fin formulae of the two species overlap, this character was of little value in the present comparisons.

It will thus be seen that the specimens resemble the haddock more strongly than the cod but show some resemblance to the cod, especially in the spotting of the upper sides.



NOTES AND OBSERVATIONS

SLATE-COLOURED JUNCO IN SOUTHERN BRITISH COLUMBIA.—For the past two winters a Slate-coloured Junco (*Junco hyemalis*) has regularly visited our feeding table at Crescent ,British Columbia, in the company with a large flock of Oregon Juncos (*Junco oreganus*), the common species in this area.

I presume it is the same bird both winters as I have not seen another Junco of this type anywhere in the district. December 24th, 1937, was the first date of observation. It stayed with us until about March 23rd, 1938. It appeared again on December 18th, 1938, and the last time I saw it was on March 31st, 1939.

Junco hyemalis is an occasional winter visitant in southern British Columbia, but it seems of interest that apparently a bird of this species made its winter home here on the coast two years in succession. It seemed to be perfectly happy with the other Juncos and its habits were identical. It gave me the impression of being slightly larger and possibly more pugnacious than its companions.

A pair of Oregon Juncos raised a family of four in our garden last July. The nest was so exposed in the grass that I had to cover it with branches to prevent it from being destroyed.—(REV.) M. W. HOLDOM.

SNOWY OWL AND RING-NECKED PHEASANT.—This morning, February 25th, 1939, when walking along Blundell Road, Lulu Island, B.C., in company with Mr. R. E. Luscher, we noticed a Snowy Owl, (*Nyctea nyctea*), sitting on a fence post some distance away. Suddenly the owl flew to a pile of earth by the side of a ditch, and as it did so, out of the grass ran a cock Ring-necked Pheasant, (*Phasianus colchicus*). We watched the two birds through our field glasses, and at first thought the owl was about to attack the pheasant, but in a moment or two the owl flew up on another post, when the pheasant came running over to where the owl was sitting and stood below looking up at the owl. After these birds had looked each other over for a few minutes, the owl flew off to a distant field. It was a most amusing sight and would seem to indicate that these birds were far from being afraid of each other.

Later on during the morning we saw another of these owls, and then found the remains of a third near the dyke; of this last bird only a few feathers and bones remained Judging from the large size and the dark feathering, the two live birds appeared to be females.—KENNETH RACEY

BOOK REVIEWS

MAMMALS OF THE PROVINCE OF QUEBEC, *by R. M. Anderson, 1938.*

Annual Report. The Provancher Society of Natural History of Canada. pp. 50-114.

Although this account is based on relatively little field work, it constitutes our first comprehensive list of the mammals of the area dealt with; the seals, walruses and cetaceans are included as well as the terrestrial mammals. By bringing together and interpreting much scattered literature, Dr. Anderson has not only contributed materially to the understanding of the fauna of a large area of eastern North America but has indicated many lines of investigation for the future in this area.—J.R.D.

A FIELD GUIDE TO THE BIRDS—by *Roger Tory Peterson; Houghton Mifflin Company, Boston, 1939: pp. 1-180, numerous illustrations in colour and in black and white.* $2.75.

A new and improved edition of Peterson's Guide is sure of a welcome from naturalists, regardless of the comparative depth of their interest in birds. It meets a definite need, and in its field it has become standard equipment. The present edition has added sizes of birds in inches, cross-references between text and plates, new plates, and a considerable amount of new material. The area of reference is enlarged; it includes Eastern United States to the Rockies, Eastern Canada and Newfoundland. In Canada the border line passes through Saskatchewan; the book does not apply to Alberta, British Columbia, the Northwest Territories, or Yukon, but experienced ornithologists in these areas will still find it useful. A rather unfortunate abbreviation is "N.F.," used throughout for "Nfld."

The Guide is designed to complement the

standard ornithological reference books. Although we look in vain for Taverner's *Birds of Canada* among the books recommended as companion volumes, Canadian users of Peterson's Guide are most emphatically advised to follow up their birds in *Birds of Canada*.—C.H.D.C.

SERENGETI—*by Audrey Moore; 265 pages, 36 illustrations; Country Life Ltd., 20 Tavistock Street, London W. C. 2, 1938; 10/6d.*

The "Age of Mammals" is not done yet in Africa. In spite of the deadly inroads of white man's civilization there is preserved still a living sample of the animal life of the Pleistocene. It is a tonic to our faith in civilization to learn that the motor car, which once seemed to threaten the wild creatures of Africa with speedy extermination, has become instead a contributor to their salvation by making it easy to visit them in their homes and both safe and easy to observe them to the best advantage.

Serengeti, the place, is a great plain with bush-bordered watercourses, lying in Tanganyika, East Africa, near the northern frontier of the territory, east of Lake Victoria. There the great beasts flourish as they do in few other places, in a setting of savage beauty which is made glorious beyond comparison by their presence. *Serengeti*, the book, by the wife of the Game Ranger for the area, takes us to live in the Serengeti Plain, makes us feel the bright African sun, the change of seasons and the renewal of life after rain, and, above all, introduces us to the wild animals, from lion and rhino down. The Serengeti Plain is famous for its lions. So many of Mrs. Moore's lion stories have sad endings, however, that we would read with heavy hearts were it not that she starts us off with a clear picture of the change from unrestricted slaughter (as "vermin") to complete protection.

Most of us—all but a fortunate few—will never see the real Serengeti. By the same token, we may never see Westminster Abbey, or the Louvre but they concern us none the less. The greatest monuments of nature and of art belong to the whole world; they are the property of the millions who will never see them just as much as of those who live in them or beside them. In return for their good fortune these latter have a greater share of the responsibility for preserving them intact. Serengeti, the place, is such a monument of living Nature, and through *Serengeti*, the book, we who may never see it may grasp some of the fullness of our heritage because the author has enjoyed so fully.

The proceeds of the book, we are told, are being devoted to improving the water supply for the animals of the proposed Serengeti National Park. Let us hope that the proposed park soon becomes a reality and that it falls short in nothing of the high standards set by other parks in Africa.

Incidentally, before reading this book the reviewer had never seen a photograph from Africa showing anything to compare with the herds of caribou which he had seen in the Thelon Sanctuary, in our own Northwest Territories. "Fifteen Miles of Game", while not one of the best pictures in the book, turns the trick by showing what was required, a landscape full of game.—C.H.D.C.

UNIVERSITY OF TORONTO STUDIES, BIOLOGICAL SERIES, No. 43. *Fluctuations in the numbers of the Varying Hare (Lepus americanus). By D. A. MacLulich, Department of Biology, University of Toronto, Toronto. The University of Toronto Press. 1937. pp. 136, fig. 18. Price $1.25.*

The common varying hare or snowshoe rabbit is one of the best known examples of a wild animal that undergoes periodic fluctuations in numbers. Richardson (1829) noted that the hares were sometimes abundant, sometimes scarce, and that they suffered from epidemics. MacFarlane, (1909), of the Hudson's Bay Company, noted a ten-year cycle in the fluctuations, Seton (1909) and Hewitt 1921) also discussed the use of fur returns in connection with abundance or scarcity of various kinds of mammals, and Elton of Oxford University has from 1924 to the present time been studying the hare cycle as shown by the records of the Hudson's Bay Company, and by questionnaires sent out by the National Parks Bureau.

Dr. MacLulich studied the varying hare in Ontario for several years and obtained information from four sources: (1) Records of furs taken by trappers, fur returns of Hudson's Bay Company, and some figures taken from the Dominion Bureau of Statistics; (2) Statements in the literature; (3) Questionnaires; (4) Field work at nine stations in Ontario.

It was found that the last year of great abundance before each great decrease or "crash," were the years: 1856, 1864, 1875, 1886, 1895, 1904, 1914, 1924, and 1934.

The abundance of hares was measured in the field by four methods: trapping, censuses of plots, comparison of numbers of hares observed

while travelling known distances, counts of droppings or scatology. Population ranged from one per square mile for extreme scarcity to over one thousand for abundance. The highest number was in the north part of Frontenac County, in July, 1932, when there were thirty-four hundred per square mile.

The last year of great abundance of hares in Ontario varied from one region to another as follows: 1932, in north part of Frontenac County; 1933,from Bruce peninsula and southern Algoma to Renfrew County; 1934, in the height of land country from Timiskaming district past Lake Nipigon to include Kenora District; 1935, in the northern part of the clay belt; 1934, on the coast of James Bay, and 1933, in the southern part of the Patricia region. For Canada as a whole the cycle appeared to reach a peak earliest in the coastal districts of the maritimes and the St. Lawrence River, the delta of the Mackenzie River, and British Columbia; and later in the northern parts of the Canadian life zone and the southern parts of the Hudsonian life zone.

The bacteriology of the varying hare was closely studied, and collections of ectoparasites and endoparasites made. A number of the intestinal bacteria found in "normal" varying hares have been identified, and a rough estimate of their frequency of occurrence obtained. Some of the infections were fatal, but there was no evidence that any of these bacterial diseases was causing epidemics. By serum tests it was shown that tularemia occurred among varying hares in widely separated parts of Ontario, but not in any large percentage of the population. Ten species of helminths, three mites, two ticks, one flea, and three other insects were secured from hares. The decrease in abundance can only be said to be due to wholesale dying-off. Information received from questionnaires suggests that the epidemics are more severe at some times than at others, and that the epidemic is not always the same disease at every time and place.

Data on the rate of reproduction bear out the statements of other naturalists to the effect that the rate is decreased at the time of decrease in abundance of hares, but it could not account for the cycle. The abundance of lynx was shown to be definitely correlated with that of varying hares, as a conclusion from a more extended and accurate analysis than had been made before, but it was demonstrated that the fluctuations in numbers of neither lynx nor varying hares are correlated with sunspots. No correlation was found between rainfall and decrease in hare numbers.

Dr. MacLulich has produced a valuable and well-worked out treatise on the varying hare, and in addition to the detailed study on fluctuations has given a large amount of miscellaneous life history notes covering reproduction, growth, body temperature, food, habitat, territory and runways, and other habits, with notes on methods of study which will be useful to students of many other mammalian species. 266 titles of literature cited are given.—R.M.A.

ANNUAL REPORT FOR 1938, PROVANCHER SOCIETY OF NATURAL HISTORY OF CANADA: *20th anniversary. Quebec. pp. 180.*

The activities of the Provancher Society, dealt with in this report, include the maintenance of a splendid bird sanctuary in the St. Lawrence near Trois Pistoles, the use of this sanctuary for bird banding and census work of great scientific value, and the encouragement of the study of natural history by the younger generation throughout the province of Quebec. The natural history exhibitions sponsored by the society are the means of educating young and old who visit them and contribute to them.

The present report, in addition to presenting an outline of activities, contains important original scientific papers. Titles noted are the following: *Some additions to the flora of Bic*, by V. C. Wynne-Edwards; *Mammals of the province of Quebec*, by R. M. Anderson; *Migration automnale de la Grande Oie Blanche*, by D. A. Déry; *Essai d'anatomie dentaire comparée*, by Dr. Viger Plamondon; *Whippoorwill and Nighthawk in the province of Quebec*, by L. McI. Terrill; *Quelques cas de migrations d'oiseaux plutôt rares*, by Rev. Henri Bernier; *First record in Belgium of the Great Black-headed Gull*, by F. Napier Smith; *Le Musée du College de Sainte-Anne-de-La-Pocatière*, by Abbe Rene Tanguay; *Waterfowl at James Bay*, by Harrison F. Lewis. The report also contains an obituary of Mgr. Phileas Fillion, first president of the society, and a splendid tribute to Brother Marie-Victorin, one of the most famous of its living members.—C.H.D.C.

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THE CANADIAN FIELD-NATURALIST

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The Canadian Field-Naturalist

VOL. LIII OTTAWA, CANADA, OCTOBER, 1939 No. 7

THE NORTHERN DISTRIBUTION AND STATUS OF THE ENGLISH SPARROW IN CANADA*

35,343

By RICHARD LEE WEAVER

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* Paper presented in part at the meeting of the American Ornithologist's Union Washington, D.C. 1939.

LESS ATTENTION is paid today to the introduced "unmitigated pest" of the nineteenth century, since the importation and continuous spread of what seems to be a more formidable enemy, the Starling.

The English Sparrow seems to have reached its maximum of abundance several decades ago, spread almost to the limits of civilization in United States and Canada, and now is probably settled into the niche that it is destined to keep for some time.

NORTHERN DISTRIBUTION OF THE ENGLISH SPARROW. (PASSER d. domesticus)

Some questions remain concerning the limits of its northern penetration, the possible migration of the species, and the present tendencies in regard to local abundance and depradation. Therefore, the writer directed personal letters, asking for information regarding these problems, to some of the ornithologists familiar with Canadian conditions. Answers were received from Messers E. R. Kalmbach, P. A. Taverner, J. H. Munro, W. E. Saunders, H. F. Lewis, William Rowan, Hoyes Lloyd, C. E. Gillham, L. L. Snyder, J. D. Soper, and R. W. Tufts. This material has been combined with that obtained by summarizing the data from the northern field reports of the United States Biological Survey. It is presented so as to record the status of the English Sparrow today and encourage continued observation of this common but neglected species.

The six questions included in each letter were:

1. What is the northern boundary of the English Sparrow's range, as you have observed it?

2. Do you feel that it is still extending its range northward?

3. Is there still evidence of local migration? (Suggested by some authors).

4. Between what dates is it found nesting?

5. Is it thought to be increasing or decreasing locally?

6. Do you feel that it is doing much damage at present?

NORTHERN BOUNDARY OF RANGE

In regard to question number one, pertaining to the northern boundary, this information was disclosed.

In eastern Canada, the birds have not been observed by Lewis along the north shore of the lower estuary of the St. Lawrence River during his eighteen summers of traveling from Comeau Bay, just east of the mouth of the Manikaugan River, to Blanc Sablon. He found it common at Quebec City, at Murray Bay, in the Gaspé Peninsula, in the Maritime Provinces, and on the Magdalen Islands. He likewise believes it to be common around Lake St. John, Quebec, at least in the larger communities. Stray specimens found on Anticosti Island have always been killed and on Lewis's last visit there in 1926 the sparrows were not established.

Taverner states "My experience is that this bird extends north regularly just as far as systematic cultivation goes. Beyond the cultivated sections you find only isolated associations that get less and less permanent northward. Throughout the north a small group will be found about most or all the settlements. This is true in Ontario at least north to the northern line of the Canadian Pacific Railroad. I understand that there are a few at Moose Factory at James Bay". Lewis on a recent trip failed to find them at Moosonee, nearby.

Saunders found the bird at Cochrane within 130 miles of James Bay seven years ago but not at Coral Rapids 75 miles from the Bay. Soper reports not having seen English Sparrows anywhere along the Labrador, in Baffin Island, or about Hudson Bay, during his investigations in the north-east.

Gillham, working in central Canada, did not find English Sparrows at all the settlements, particularly Aklavik, N.W.T.

Rowan reports seeing a bird at Fort Smith in the N.W.T. in 1925 and at the mission 20 miles north. Munro gives the northern limit of the range in Alberta as Lac la Biche, and for British Columbia as —"towns, and on the main line of the Canadian National Railway."

Kalmbach states that, "the English Sparrow is generally distributed through the agricultural sections of western Canada". He observed it up to the northern edge of the agricultural belt and on a recent trip through the Canadian Rockies, "found it at practically all settlements in the Kootenay and Yoho countries as well as in the Banff and Jasper Parks." G. B. Saunders reported to Kalmbach that he had encountered the birds throughout the farming area in the Peace River country, as well as at Fort Chipewyan.

The most northerly record found by Kalmbach was the one published by Williams in *The Canadian Field-Naturalist* (36; 64, 1922). He recorded the birds at Two Island Village, 30 miles below Fort Simpson at about North latitude 62 degrees.

In the two years spent by Soper 1932-34, in Wood Buffalo Park west of Slave River and Lake Athabasca, he saw only three English Sparrows. Two stayed at the park headquarters 27 miles south of Fitzgerald. This was the farthest north he had observed them in that region. The other bird was alone, north of Pine Lake, about 35 miles west of Slave River at a spot called Junction Lake. Soper failed to note the species at Chipewyan, Fitzgerald, Fort Smith, and Fort Resolution.

EXTENSION OF RANGE

In answer to, "Is the English Sparrow extending its range northward?" these answers were received;

Lewis says, "I do not think that the English Sparrow is now extending its range northward except as conditions change in its favour. As new railroads, new highways, and new areas of cultivation extend into the north country,

the English Sparrow population inclines to follow the routes made available to it".

Taverner makes a similar statement, "The winter survival in the north seems closely tied up with man's works, especially their horses" but points out that "as most of the work is mechanized in the north with such few horses, no great extension of range for the species is probable."

He feels that saturation is reached and will remain about static unless unexpected agriculture or stock-raising develops. He records the birds as permanently settled in Manitoba in the neighbourhood of man to The Pas and Cormorant. One hundred and eighty-five miles north of here at Thicket Portage, seems to be the edge of their settlement according to Taverner but, he believes that they suffer winter killing here. They are at Churchill but exist in winter only by inhabiting the railroad roundhouse where they get shelter and food from man.

Snyder reports unsuccessful attempts of pioneer individuals to establish themselves to the northward, being able to nest in many towns from the northern Algoma district northward, but eventually disappearing, probably from the severe cold of winter. Even though it is fairly successfully established here and there north to the Canadian Transcontinental, their population experiences difficulty in holding its own. Snyder places the successful northern boundary along the southern Canadian zone from Lake Nipissing west to the Lake of the Woods, for climate and habitat reasons.

Rowan reports the Sparrow as being fully established and stationary in the Province of Alberta for many years.

These records combined with Biological Survey reports, summarized in Figure 1, indicate that the northern boundary of the species can be drawn to show an area of abundance from Cape Breton Island on the eastern coast, through St. John and Fredericton, New Brunswick; north about 100 miles north-east of Quebec, west to Lake Nipissing, and on to the Lake-of-the-Woods, in Ontario; through Winnipeg, Manitoba; Saskatoon, Saskatchewan; Edmonton and Jasper Park, Alberta; and thence south to Lake Okanagan and Vancouver, British Columbia. Occasional colonies have been able to survive at Godbout and Lake St. John, Quebec; Cochrane, Ontario; The Pas, Manitoba; and Lac La Biche, Alberta. Northernmost records are those at Fort Simpson, Fort Chipewyan, Churchill, Oxford House, Moose Factory, and Anticosti Island.

MIGRATION

In regard to whether the Sparrow migrates, Lewis, Taverner, Rowan, and Kalmbach all report seasonal shifting in response to an abundance of food, but do not regard this as migration. Kalmbach says, "This drift usually takes on the aspect of a movement between urban winter homes and open fields and grain where food is abundant during and after harvest".

Lewis believes this type of seasonal movement becomes noticeable at about the latitude of Toronto and is very conspicuous at Ottawa, Montreal and farther north.

Snyder says, "There is undoubtedly local movement in the Toronto region but movements that can be termed a migration cannot be vouched for from Toronto observations. Least abundant in January, increases gradually in February, number constant throughout Spring, and more abundant in July and August, most abundant in September, falling of to winter level in late October—migration? Perhaps emigration or scattering of flocks."

SEASON OF NESTING

Only a small amount of attention has been paid to the season of nesting, at least accurate or rather definite records are in the main, lacking.

Lewis reports carrying of nesting material about February 26, 1937, at Ottawa, Ontario. However this occurred at Ithaca, N.Y., in February and March and the first eggs were not found until April.

Tufts reports similar carrying of nesting material March 4, 1919, and copulation March 17, 1937, at Wolfville, N. S.

Snyder reports eggs April 24 and young just out of the nest as late as September 8 for the Toronto region.

Saunders states that nesting activities for London, Ontario, occur between April 20 and the end of the summer, mostly May and June.

Rowan lists the end of March as the earliest date but this is exceptional and that mid-April is probably nearer the usual date. He gives July as the end of the season, but I think careful checking would extend the time possibly.

Soper limits the season from April to August in the Winnipeg region.

STATUS OF POPULATION

This information was secured relative to the increase or decrease of the species. Tufts indicates a decrease over the last decade, citing flocks containing several hundred to a thousand birds that were common in earlier days around the oat fields, but have now disappeared. He gives the advent of the motor car as the probable reason.

Lewis likewise believes the species to have decreased for some time past in Canadian cities, giving the decrease of horses as the probable

reason. North of Toronto this has probably meant a decrease in the total population, but south of Toronto this is questionable. Here the birds live freely in the country throughout the year and he thinks it is an open question whether or not the total population has seriously diminished.

Taverner thinks the population now static, a condition reached after a considerable decrease and due to the decrease of horses.

Snyder says, "So far as the observation of older observers testify, the English Sparrow is definitely less plentiful now than thirty years ago. Local (Toronto) long-time records suggest three or four year periodic fluctuations of English Sparrows now. (Peaks 1926, 1929, 1933, 1936?)"

Soper believes there is little evidence of falling off in general abundance about farms and villages in the Prairie Provinces where it is common. The species may have decreased in the larger cities but he finds it quite numerous in Winnipeg and surrounding suburbs.

Rowan thinks the numbers seem to be stationary though there is evidence of larger numbers following unusually mild winters. He also points out that the species is sufficiently scarce for a good many farmers to provide them with nesting boxes for the sake of having a few there for company during the winter months.

Munro received the impression in Alberta and Saskatchewan that the species was more abundant in rural districts than in the cities due to the adequate nesting sites and much waste grain. In towns the areas adjacent to grain elevators have large populations which constitute special conditions applicable to the Prairie Provinces.

Kalmbach makes this statement in regard to a decline in population, "As to factors that may have caused a decline of the sparrow population in the eastern United States, I cannot commit myself with assurance that the passing of the horse and buggy age and the coming of the automobile has had its influence. It appears to be a plausible but not completely proven surmise. From our examination of 8000 English Sparrow stomachs we find that oats (other than that obtained from mixed feed) constitutes less than 15% of the annual food of this bird, and the bulk of this was taken from May to August, while in December it had reached a minimum of only 2 and a fraction per cent of the diet. So, although the passing of the horse may present plausible contention for the decrease of the sparrow, our Food Habits studies have not strongly substantiated it. A number of factors may have conspired to bring this about, including disease, parasitism, and even less understood factors that tend to readjust the numbers of species after a period of over-abundance. The fact remains, however, that the English Sparrow is more abundant in the West than in the East at the present time. In the Salt Lake Valley it is extraordinarily abundant, a condition which I believe is due to the extensive raising of grain in the valley, as well as the abundance of nesting sites available. I believe that the ratio of the automobile to the horse population there is not greatly different from that prevailing at numerous points in the East, where the Sparrow is much less abundant." Mr. Kalmbach adds this explanation to the foregoing remarks, "The comments on the decrease of the English Sparrow must be considered little more than a personal opinion To prove a thing of this kind would require an enormous amount of intensive study over a long period."

In British Columbia, Munro believes that the population has now become stabilized although he has no quantitative data. It is still largely an urban and suburban species and is decidedly sedentary in habit. As an example, he points out that it nests and winters in a flock at Okanagan Landing, yet he has only observed one in his garden, one mile away. In Vancouver it competes rather unsuccessfully with the Crested Mynah for food and nesting sites.

ECONOMIC IMPORTANCE

In considering the economic importance of the species, the people cooperating in this survey had these statements to make. Tufts feels that the English Sparrows are never seriously destructive aside from bullying the Tree, Barn and Cliff Swallows. They have dislodged some of the young from the nests. Some oats are stolen but is largely offset by the immense number of canker worms and other pests which they feed the young.

Lewis thinks the English Sparrow is not doing much damage at present in his region but points out that it does still interfere frequently with Tree Swallows and Bluebirds, attempting to nest in houses provided for them in towns and cities or about country barnyards.

Taverner states, "I do not think the species in its present numbers is doing any particular damage. The advent of the automobile has reduced the numbers to innocuity".

Snyder believes they are not doing much damage at present and Saunders points out that the damage done is no longer noticed as much as formerly and our thoughts are more likely to turn to the Starling now.

Rowan feels they are doing little damage but records that frequent complaints are made at lumber yards concerning the mess made during winter on wood when the birds congregate under sheds.

Soper says, "It is my opinion that damage caused by the English Sparrow continues the same as in the past few decades in the West since the species invaded the territory in numbers."

Munro says, "apart from its being a general and unpleasant nuisance I feel that the damage done is limited to competition for nesting sites with native species."

CONCLUSIONS

1. The northern line of abundance of the English Sparrow seems fairly well settled with only occasional new colonies attempting to move northward.

2. Special conditions permit a few colonies to winter farther northward than ordinarily, as at Churchill.

3. Some instances of migration have occurred especially in the Point Pelee, Ontario, and Michigan region, but most movements are seasonal wanderings in response to food conditions.

4. The nesting season extends roughly from mid-April to the end of July or mid-August. Additional observations are needed especially in the northern areas.

5. It is generally conceded to be decreasing and this is supposedly due to the decrease of horses, although Biological Survey food analyses of 8000 stomachs alter and perhaps undermine this widespread conception.

6. Damage at present seems less than in former years and centers largely around competition with Swallows and Bluebirds for nesting sites.

Note by the Ornithological Editor.

It is doubtful if stomach analysis can have much bearing upon the relation between the English Sparrow and the automobile, unless time, place, season and several other factors are carefully considered. It is not a question of what the sparrows ate or eat, but upon how much there was, or is, to be eaten in the various concentration localities during the critical and controlling time of the year.

Perhaps the farm-yard and small village sparrow populations have not been spectacularly reduced by the advent of the automobile, but the great concentrations of birds were in the cities, and in winter their main food reliance was the liberally scattered horse-droppings in the streets. Those of to-day, or even of yesterday, can hardly realize the condition of our streets in those days, and the constant services of "white-wings" required to keep them even approximately clean. The available food supply of our cities has been materially altered since horse and buggy days, and it would be impossible for them to-day to support through the winter the numbers of sparrows that were common then. We, who experienced it, can remember the trouble caused by immense sparrow congregations; the untidiness of their bulky nests and the defilement of the surfaces of commercial, public and private buildings; the noise and dirt in vine-clad walls, breaking morning slumbers and even interfering with church services; sidewalks made unusable at certain hours of the day by the hosts in the shade trees overhead; and the constant bickering over the refuse on even the most commercial streets. Most of this is of the past. The Starling and the Domestic Pigeon replace them in only a slight and much less universal degree. There can hardly be a doubt but that the replacement of horses by mechanical power was a primary factor in this notable reduction of nuisance city population. —P.A.T.

LAND MOLLUSKS OF SMOKY FALLS, COCHRANE DISTRICT, ONTARIO

By R. V. WHELAN and JOHN OUGHTON

LISTS OF SHELLS of northern Ontario are scarce. The present one is based upon about two thousand specimens, collected in and around Smoky Falls in the years 1936-38. In addition, three dried samples, each of one square foot area of ground, have been screened and searched for the more minute shells. The specimens have been deposited in the Royal Ontario Museum of Zoology.

Smoky Falls is a small community situated on the west bank of the Mattagami River, approximately 100 miles south of James Bay. It lies in 50° 05′ north latitude and 82° 10′ west longitude at an elevation of 570 feet above sea level. The climate is one of extremes. While the mean annual temperature is just a little above freezing viz. 34.6° F., the mean summer temperature is 60° F. The maximum temperature on record is 100.2° F., the minimum is—50° F. The rainfall is 14 inches per annum. If the snowfall is included, the mean total precipitation is 26.7 inches for one year. The common trees are white and black spruce (*Picea canadensis* BSP. and *P. mariana* BSP.), jack pine (*Pinus Banksiana* Lambert), balsam fir (*Abies balsamea* Mill.), tamarack (*Larix laricina* Koch.), birch (*Betula papyrifera* Marsh), and poplars (*Populus tremuloides* Michx. and *P. balsamifera* L.)

Only the more interesting notes on habitat are included.

1. *Vitrina limpida* Gould: apparently common: in water, under leaves and boards.

2. *Retinella hammonis* (Ström). apparently common: marsh: in water under leaves and boards: edge of pond under logs and boards.

3. *Retinella binneyana* (Morse). Probably common: in water under boards and leaves: 3 living specimens found in 1 sq. ft. sample of sphagnum from bog.

4. *Striatura exigua* (Stimpson): Common: in 2 sq. ft. sample of leaf mould a total of 21 living and 37 dead shells were found.

5. *Euconulus fulvus* (Müller); Common: edge of pond under boards and logs: in water under leaves and boards: under moss.

6. *Zonitoides arboreus* (Say): Very common: marsh: in water under leaves and boards: edge of pond under logs and boards: old sawmill under boards: 3 living and 1 dead specimen were found in 1 square foot sample of sphagnum from a bog.

7. *Deroceras agreste* (L.): Probably not common: under boards on sidewalk: a few mature specimens: colour pattern variable, ranging from an uniform buff to a buff ground with neatly lined grooves or overlaid with cloudy dark masses.

8. *Deroceras gracile* Raf.: This appears to be more abundant than *D. agreste*. Under damp boards and rotten canvas: under stones: under logs and boards at edge of pond. Colour pattern variable: a uniform pale gray brown: or with slight dark lines marking the grooves: or with small irregular blotches. The labels indicate that in life some of these were streaked with chocolate colour in the grooves. Some 50 immature *Deroceras* collected in the spring and summer have been examined and contain only the female organs. These are apparently in large part *D. gracile*. In a few of these young slugs, nematodes were noticed in the anterior dorsal part of the body.

9. *Discus cronkhitei anthonyi* (Pils.): Common: in water under boards and leaves: edge of pond under logs and boards. 263 specimens, of which 20 (i.e. 8%) were the var. *albina* "Morse" Ckll. A few shells are perhaps angulate enough to be termed var. *catskillensis* (Pils.) but most of them are rather rounded.

10. *Punctum pygmaeum* (Drap.) Probably common: a total of 32 living and 15 dead shells was obtained in 2 sq. ft. of leaf mould. Eight shells are white, the remainder are brown.

11. *Succinea ovalis* Say. Common: edge of pond: abundant under logs and boards: in water under boards and leaves: on sidewalk: on rhubarb; on *Achillea millefolium* L. (Yarrow): 2 living specimens in moss at bottom of nest of white-throated sparrow. This gives some substantiation for the belief that birds play a role, even though a minor one, in the dispersal of mollusks. One half-grown specimen collected in a ground sample was found to be still alive in March. It had existed without food or water for over 4 months in a warm museum room, in a soil sample which had been desiccated to powder-dryness. This is a striking demonstration of how some of our land snails can survive droughts.

12. *Succinea avara* Say. Scarce: edge of pond under leaves and boards: in water under boards.

13. *Zoögenetes harpa* (Say). Probably common: under moss: leaf mould.

14. *Vertigo ventricosa* (Morse). (var. *elatior* Sterki?). 3 specimens, 4¾ to 5 whorls: average length 1.8 mm., average diameter 1.1 mm.: under boards in water.

15. *Vertigo gouldii* (Binney) var. Two adults and one immature specimen were obtained from one square foot of leaf mould. The distinctly striate type of *Vertigo* (*V. nylanderi* Sterki, *V. gouldii* (Binney) and its varieties) is moderately common in Ontario. However, the relationship of these forms is not clear.

16. *Columella edentula* (Drap.). Probably common: 21 living, 16 dead specimens obtained in 2 sq. feet leaf mould.

17. *Cochlicopa lubrica* (Müller). Very common: at edge of pond very abundant under logs and boards: abundant in water under leaves and boards: 1 dead shell in moss at bottom of white-throated sparrow's nest. These shells fit typical *lubrica* rather than the var. *morseana* Doherty.

18. *Planogyra asteriscus* (Morse). Scarce? 4 living, 3 dead specimens were found in 1 sq. ft. of leaf mould. In Michigan ([1]), ([2]), this elusive little snail is reported to live at the edge of bogs. The present record may indicate a wider range of habitat in the northern part of its distribution

19. *Carychium exile* var. *canadense* Clapp: 13 specimens, of which 10 were mature and possessed the following average dimensions: length 2.0 mm., maximum diameter 0.76 mm., ratio of diameter to length equals 0.375

Goodrich ([3]) and Richards ([4]) have found *Zonitoides nitidus* (Müller), *Succinea retusa* Lea, *Pupilla muscorum* (L.) and *Vertigo pygmaea* (Drap.) in the region of Moosonee. These species may be expected at Smoky Falls.

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ADDITIONAL NOTES ON THE FAUNA OF KING TOWNSHIP, YORK COUNTY, ONTARIO

By R. D. USSHER

A GROUP OF papers which appeared in 1930 (Snyder and Logier), under the title, *A Faunal Investigation of King Township, York County, Ontario*, (1930) has served to draw attention to an area of particular interest in the Toronto region. These papers presented the results of field work carried on by members of the staff of the Royal Ontario Museum of Zoology, largely during the summer of 1926, and constituted a basis for subsequent studies.

In 1937 a survey of forest-cover, erosion, and wild life conditions was made and a report was published in 1938 under the title, *The Natural Resources of King Township* (Mayall). The writer was one of a staff concerned with this survey. This work together with observations made in the township as a resident there since 1931 and the pertinent notes by other naturalists who have visited the township more or less regularly since 1926 makes it possible to bring up to date our information on the fauna of the township with respect to those groups reported on in the original lists of Snyder and Logier.

Three additions to the list of mammals of King Township (Snyder) have been made. These, marked with an asterisk, are now recorded with annotations regarding their occurrence, together with comments on five species which appeared on the original list.

Concerning birds, the following notes deal with the breeding or summer resident forms as did the original paper (Snyder). Thirty-seven species can now be added to the list of summer birds; several of these are obviously transients in the area. Those not recorded previously by Snyder are marked with an asterisk. Information on thirty-nine species previously recorded is given where a change of status is evident or where our knowledge, such as breeding data, has been expanded or clarified. The total of summer resident birds (June, July and August) now stands at one hundred and fifty, one hundred and five of which are known to breed there.[1]

One amphibian and one reptile are added here to the list (marked with an asterisk) previously published (Logier) and comment on one form previously listed is made.

In order to avoid repetitions, references to the original papers of 1930 have been omitted in many cases; absence of the asterisk or reference to findings of the Museum's party in 1926, indicate that the species has been already recorded from the township by Snyder and Logier.

It might be noted that the "Toronto region" as interpreted in this paper refers to the area embraced by boundaries arbitrarily set at twenty-five miles outward from the city limits. This region includes all of King Township except the lower, or undrained Holland Marsh, lying downstream beyond and north-east of Bradford. Incidentally the drainage of the upper portion of the Holland River flats is a project completed since the survey of 1926. Very probably this alteration has affected the animal life of that sector, qualitatively and quantitatively. Furthermore, the twelve or more years have undoubtedly brought about a decline in the older forest cover, which would seem to have affected the animal life, unfavourably in some and perhaps favourably in other cases but not always measurably.

The writer wishes to thank the many naturalists who have supplied data for record in this

1. In the Natural Resources of King Township a list of all species known to occur in King Township at all seasons is tabulated without annotations. The list includes 212 species; an additional one, the American Coot, was inadvertently omitted, making the corrected total, 213. "to which can now be added the Wilson's Phalarope (214th species) one of which the author identified near Nancy Lake on May 17, 1939."

revision. Where records are other than the writer's, authorities are acknowledged in the text. Thanks are also due to Mr. L. L. Snyder and Mr. J. L. Baillie, Jr., for suggestions during the preparation of the manuscript.

MAMMALS

Condylura cristata. STAR-NOSED MOLE.—Specimens from Nancy Lake Farm, where workings are not uncommonly seen in low ground, are now in the Museum. A nest of five young was found in the base of a pile of litter from a chicken house on May 22, 1937. An adult was picked up dead on the snow, near Nancy Lake, December 16, 1938.

Sorex fumeus fumeus. SMOKY SHREW.—Since the recording (Snyder, 1930) of a specimen from Pottageville, the only one known from Toronto region at that time, another has turned up in the R.O.M.Z. collection, a specimen taken at Etobicoke on May 12, 1900. Although not a King Township record, the specimen is of interest for the Toronto region.

Glaucomys volans. EASTERN FLYING SQUIRREL.—Two, reported to be of this species were captured in the southern part of the township on October 30, 1938, by Mr. W. V. Crich. They were examined in life, and the fur on the under side found to be white at the base. No specimens are known from the township, but the species has been taken at Toronto.

Synaptomys cooperi cooperi. LEMMING MOUSE.—A specimen taken at Pottageville on October 10, 1932, by Prof. A. F. Coventry is the first known from the Toronto region as here defined. The locality (Forks of Credit) from which Hope (1933) recorded the species as new for Toronto, is here considered to be outside the region. Curiously enough, one specimen taken at Forks of Credit and the Pottageville specimen were taken from traps about the same time of day on the same date. Our definition of the "Toronto region" avoids the issue of priority of capture which is often debated, in fun, as between these two specimens. Since Prof. Coventry's capture, individuals have been taken at Pottageville, September 11, 1935, by S. C. Downing, and July 30, 1936, by L. A. Prince. Specimens are in the R. O. M. Z.

Napaeozapus insignis. WOODLAND JUMPING MOUSE.—The initial record for this species was made at Nancy Lake on May 22, 1938. Two specimens taken on that day by Messrs. R. J. Rutter and T. M. Shortt, are now in the R.O.M.Z. collection. Their capture constitutes another basis for good-natured bantering on the subject of priority. On the afternoon of that day these observers discovered two jumping mice together, apparently copulating. They were on the forest floor among dead beech leaves. When disturbed they sprang apart and "froze", apparently relying on their concealment. Mr. Rutter captured the first specimen on the ground: Mr. Shortt then secured the second which was attempting to climb a rough-barked tree and had reached a point approximately three feet from the ground. The issue was clear up to this point, when Mr. Rutter's mouse escaped. Its subsequent recapture by Mr. Rutter still leaves the matter of priority debatable. Incidentally neither of the captured mice attempted to bite when handled.

Erethizon dorsatum dorsatum. PORCUPINE.—This interesting mammal may stray south occasionally from the Holland swamp from whence it was first reported. Mr. C. E. Hope reported one killed by a farmer near King City in 1930. A recently occupied den in a hollow beech tree on the mid-township ridge was found on May 19, 1937. During the summer of this year the species was observed near Pottageville, and trees which had been barked by it, were noted in widely separated portions of the main swamp.

Lepus americanus virginianus VARYING HARE.—This northern species may also wander south from the Holland swamp on occasions. Two have been noted near Nancy Lake in recent years. About March 12, 1939, one was reported by description to the writer, from this section.

Odocoileus virginianus borealis. WHITE-TAILED DEER.—These animals have increased considerably since the recording of individuals by Snyder (1930). Estimates of the number now present, run from forty to four hundred (the latter, perhaps too high) practically all of which are in the Holland swamp, (Mayall, 1938). They wander south through the township, and individuals have been noted every year since 1929 at Nancy Lake Farm. A deer was put up on July 6, 1937, within sight of King village.

BIRDS

**Colymbus grisegena holboelli.* [2] HOLBOELL'S GREBE.—Although undoubtedly a migrant species in the township, three were seen at Nancy Lake on August 8, 1937, and one at the same place on July 29, 1938.

**Podilymbus podiceps podiceps.* PIED-BILLED GREBE.—Now known as a breeder at a few of the small lakes and sloughs; also seen with young

[2] Since the nomenclature of Snyder's list followed the *A.O.U. Checklist* the current *Checklist* is followed here, except as noted, rather than Taverner's *Birds of Canada.*

on the lower Holland River, July 7, 1937. Two broods of young were noted on Kelly Lake on June 9, 1935; a nest with five eggs was found at Nancy Lake on May 28, 1938.

**Florida caerulea caerulea.* LITTLE BLUE HERON.—Two birds in the white immature plumage were seen at Nancy Lake on July 27, 1930, the first recorded occurrence in the Toronto region; they were noted again on July 29 and 30. (Ussher, 1931). Yellowish legs, relatively short bills, absence of colour in plumage, were noted. They appeared slim, and smaller than a Bittern.

Nycticorax nycticorax hoactli. BLACK-CROWNED NIGHT HERON.—In addition to the records mentioned by Snyder (1930), (one of which was extralimital), an immature bird was seen at a small pond near Laskay on July 30, 1937.

Botaurus lentiginosus. AMERICAN BITTERN.—The status of this species is probably not much changed, but breeding records can now be added. Two nests found in the slough east of Kelly Lake on June 9, 1935, were only fifty feet apart, one contained five eggs and the other five young several days old. Young birds just able to fly were seen in the lower Holland Marsh on August 2, 1937. Three young which had apparently just been frightened into leaving the nest by our approach, near Laskay, July 1, 1937, were observed half swimming, half floundering about among the cat-tails in fairly deep water near the nest site.

**Ixobrychus exilis exilis.* EASTERN LEAST BITTERN.—This species was discovered in small numbers along the Holland River, just below Bradford, in July, 1937. Mr. W. V. Crich noted eight birds (including four immature), and found a nest with six eggs, in the same area on June 18, 1938.

**Anas platyrhynchos platyrthynchos.* COMMON MALLARD.—Single females were seen in two different localities during the summer of 1937. On July 27 a bird with seven half-grown young was found at a small lake north-west of Kelly Lake; the young were observed in flight on August 5. This apparently constitutes the first breeding record for the Toronto region.

**Anas rubripes tristis.* COMMON BLACK DUCK.—It seems that the status of this species has undoubtedly changed since 1926. No summer observations had been made at that time. During the years 1929-1931 inclusive, a few were observed at Nancy Lake, in early August; in 1933 and 1934, the first were noted on July 27, and July 10, respectively. In 1937 Black Duck were found breeding in ten different localities. Two nests of nine and ten eggs were found on May 22 in the flooded alders near the canal. Another was found in a hollow stump in the centre of a small pond near Laskay. It contained four eggs on June 3 and nine on July 1, six of which were pipped, giving an incubation period of about twenty-three days, rather shorter than usually noted. A nest with nine eggs, found on June 28 by Mr. D. A. Ross, was located in the drained marsh a good half-mile from water; this was the only indication of breeding in the central part of the Holland River flats.

A series of small ponds north-west of Kelly Lake held a concentration of Black Ducks in late July and early August, 1937. An estimate of ninety birds was made on August 5. (Mayall, 1938) They occurred together with a few Mallards, Pintails, Wood Ducks, Blue-winged Teal, and Green-winged Teal. Smaller flocks were observed at this period in the lower parts of the Holland Marsh.

**Mareca americana.* BALDPATE.—A single female noted on Nancy Lake, on or about June 19, 1932, constitutes the only summer record.

**Dafila acuta tzitzihoa.* AMERICAN PINTAIL.—Two were noted in the concentration of ducks noted under the Black Duck, on July 24, 1937, and one on the 27th, all in female or immature male plumage. On July 22, 1937, in the central Holland River flats, two broken eggs, closely resembling those of the Pintail, by comparison, were picked up.

**Nettion carolinense.* GREEN-WINGED TEAL.—Single birds were noted in early August, 1937; one with the concentration of Black Ducks on August 5, others at small temporary ponds near Nancy Lake, August 12 and 14.

Querquedula discors. BLUE-WINGED TEAL.—On May 31, 1937, a female was flushed from a well concealed nest, with twelve eggs, in the base of a clump of rushes at the margin of a small pond at Kelly Lake. The location was in a pasture containing cattle, within a few feet of a public road. The brood had hatched by June 22. Two were flushed from a creek near Pottageville on July 31, and on August 2, three young birds were noted on the lower Holland River, and an adult at Mount Mellick pond.

These records probably indicate an increase of the species since 1926, a feature apparently true in southern Ontario generally.

Aix sponsa. WOOD DUCK.—Two were present at Nancy Lake from August 10 to 19, 1936. During 1937, one was seen with a large flock of Black Ducks and others, on July 24, and five were noted on a small lake nearby on July 27 by Mr. D. A. Ross and the writer. Two were seen again on Nancy Lake, August 16, 1938.

Some increase in this species may have occurred since 1926.

**Nyroca* sp. SCAUP DUCK.—On July 27, 1935, Mr. J. L. Baillie noted three Scaup on Nancy Lake A male bird was noted on the same lake on June 4, 1937. The probabilities point to these being Lesser Scaup but in the absence of specimens specific identification remains in doubt. In this Mr. Baillie concurs.

**Lophodytes cucullatus.* HOODED MERGANSER.—Single birds, apparently immature, have been noted on Nancy Lake, July 26, 1934, and July 20, 1937, and one near Pottageville on July 31, 1937.

Accipiter striatus velox. SHARP-SHINNED HAWK.—Baillie and Harrington (1936) record a nest and three eggs taken by Mr. S. L. Thompson, at Pottageville on May 15, 1933. This is the only breeding record for the township, and one of the few summer records. The specific name *striatus* is used on the authority of Snyder (1938).

Accipiter cooperi. COOPER'S HAWK.—Additional summer records were obtained in 1937. Mr. D. A. Ross located a nest and four eggs, thirty-five feet up in a white pine near Laskay on May 24. The bird, which was still incubating on June 14, eventually abandoned the eggs, (now in the R.O.M.Z.). Single birds were seen on several occasions near Pottageville during the summer of 1937.

Buteo borealis borealis. EASTERN RED-TAILED HAWK.—A nest of this species was found on April 19, 1936, in the main crotch of a large dead elm, in a very open situation at the edge of the swamp near Pottageville. Incubation was apparently in progress On May 14 a young bird was visible in the nest. This site was again occupied in 1937 and a bird was flushed there on April 16. The nest was later found to be abandoned. In 1938, a pair was located in a new station near Nancy Lake; young were noted there near the nesting site, on July 7. Apparently the status has not changed markedly since 1926. The species is much less common than the next named.

Buteo lineatus lineatus. NORTHERN RED-SHOULDERED HAWK.—This species appears to have increased considerably since 1926 and is now the best distributed and commonest breeding hawk. (Mayall, 1938). Most of the larger wooded areas contain a pair and they are very faithful to their chosen localities. A pair has bred every year since 1929 in the bush at Nancy Lake; the present nest, located sixty feet up in a large sugar maple, has been used for the last three years, and possibly longer. Repairs are made as early as the last week in March and a young bird was seen near the site on June 22, 1938.

**Buteo platypterus platypterus.* BROAD-WINGED HAWK.—The first summer record was obtained in 1937. An adult and two immature birds were found in a mixed bushlot west of Nancy Lake Farm on July 22. A recently vacated nest, forty feet up in a hemlock was found there, and from the actions of the birds, it seemed not unlikely that they had nested. No other summer occurrences are known. The species is not definitely known to breed in the Toronto region.

**Pandion haliaetus carolinensis.* OSPREY.—An individual of this species was seen at Nancy Lake on August 15, 1933, by Col. J. F. H. Ussher. Three were noted on August 2, 1937, working their way south over the lower Holland Marsh from the direction of Lake Simcoe.

Phasianus colchicus torquatus. RING-NECKED PHEASANT.—This introduced species appears to have difficulty in maintaining itself in the township, although it is obviously more common now than in 1926. In the swampy alder thickets around Nancy Lake, it was not unusual to flush ten or twelve birds in the late fall of 1933. Since then the species has been much reduced in numbers, never recovering from the severe winter of 1933-34 (Mayall, 1938).

Considerable stocking took place in 1938, when the township was made a Game Preserve Area. Three days of Pheasant shooting were held in the autumn of that year. It is not believed that many birds were shot.

A nest with fifteen eggs was found in a wet situation among small cedars at Nancy Lake Farm on May 14, 1933.

Rallus limicola limicola. VIRGINIA RAIL.—As might be expected, work since 1926 had added materially to our knowledge of the numbers and distribution of this rail. It is not an uncommon breeder in the lower, undrained portion of the Holland Marsh, and also at many of the lakes, ponds, and sloughs throughout the central and southern sections.

A nest with nine eggs was located in dense cattails at Nancy Lake on June 5, 1938, A second, found at a small lake north-west of Kelly Lake on June 8, contained the unusually large clutch of fourteen eggs, two lying on top of the rest. The incubating bird in this case did not skulk but flew direct from the nest with no effort at concealment. An adult with one downy young was seen on July 13, 1938, feeding about a small muddy cattle pond on Concession V, completely devoid of immediate cover, and when disturbed ran off into standing grain.

Porzana carolina. SORA.—This species appears to be somewhat less common than the Virginia Rail, but with similar, general distribution. A definite breeding record can now be made. A nest was found on June 2, 1937, containing seven eggs. It was located among rather scattered cat-tails in a small pond at Mary Lake Farm.

**Coturnicops noveboracensis.* YELLOW RAIL.—First found by Messrs J. L. Baillie, R. J. Rutter, and R. E. Bennett, in the open Holland Marsh on May 25, 1929, at which time a single bird was flushed. The writer heard one at about the same place on May 28, 1937. About dusk on June 28 this locality was visited in company with Mr. D. A. Ross. Two rails were heard giving their characteristic *kik-kik, kik-kik-kik,* calls. After dark they were repeatedly flushed, often from our very feet, and were observed with the aid of flashlights.

The species has not been noted elsewhere in the township, but may be generally distributed in the Holland Marsh, since several birds have been found below Bradford, on the Simcoe County side of the river, where it breeds (Devitt, 1939.) A male bird from the marsh, taken July 18, 1937, is in the collection of Mr. J. H. Fleming.

It is possible that this species was not present on the undrained Holland River flats in 1926, although a small population could readily escape observation.

**Gallinula chloropus cachinnans.* FLORIDA GALLINULE —Neither as abundant nor as well distributed as the Virgina and Sora Rails. Two or three birds were noted at Nancy Lake during June, 1931. A nest with six eggs was found in dense cat-tails at a small pond near Laskay, June 25, 1937. When visited again on July 1, the last egg was just hatching. At Mount Mellick pond at least three adults and twelve young were observed on July 22, 1938. Occasional birds have been seen along the Holland River.

Although some of these situations were visited by the Museum party on one or more occasions in 1926, the species was not observed. Possibly it is erratic in its occurrence.

**Fulica americana americana.* AMERICAN COOT.—Apparently a migrant species which occurs rarely in summer, in fact it is quite uncommon at all seasons. Single birds have been noted at Nancy Lake: June 28, 1930, and June 2, 1937.

**Charadrius semipalmatus.* SEMIPALMATED PLOVER.—During the wet spring of 1936 a low-lying field on the VIth concession road near Nancy Lake Farm, was partly covered with water up to June 10. The temporary ponds proved attractive during April and May to such species as Holboell's Grebe, Greater Yellow-legs, and Ring-billed Gull. During the last week of May well over a hundred shorebirds were concentrated here, including,—Semipalmated Plover, Killdeer, Black-bellied Plover, Ruddy Turnstone, American Knot, Least Sandpiper, Red-backed Sandpiper and Semipalmated Sandpiper. The "Peeps" were in the majority.

Semipalmated Plover lingered here in small numbers up to June 7. A few were also noted near Nancy Lake on August 10, 1937. While the species appears on the list by virtue of these summer records, it is, of course, known only as a migrant.

Philohela minor. AMERICAN WOODCOCK.—A species which would appear to have increased in numbers since the Museum survey in 1926. Single Woodcock were flushed near Nancy Lake on August 3, 1934, and June 29, 1936. A nest with four eggs was found, thanks to the writer's dog, which scared off the incubating bird at the margin of an alder swamp and an overgrown weedy field at Nancy Lake on April 25, 1937. During the 1937 survey, individuals were found in seven localities (Mayall 1938); Mr. D. A. Ross found three abandoned eggs in a nest at Pottageville on June 11. Baillie and Harrington (1936) record the banding of three young at Pottageville by C. H. D. Clarke.

Capella delicata. WILSON'S SNIPE.—A single bird was seen at Nancy Lake Farm on July 18, 1936. A few were found during July and August, 1937, in the undrained Holland Marsh, by Mr. D. A. Ross and the writer. None was noted in the drained area, where occasional birds had been previously observed (Snyder, 1930) before drainage took place. Migrants appear through the township in early August and as many as fifteen were found in a damp field near Nancy Lake on August 20, 1937.

As with most of the shore birds, their appearance or non-appearance during migration depends to a large extent on the nature of the season. After a dry summer few are noted. The same is true to some degree of the ducks.

**Bartramia longicauda.* UPLAND PLOVER.—The only record is that of a pair observed in the drained marsh on June 12, 1937.

**Totanus melanoleucus.* GREATER YELLOW-LEGS.—An individual was noted at Mount Mellick pond on July 31, 1937. This species, like the more common Lesser Yellow-legs and Solitary Sandpiper, is to be seen occasionally during July and August.

**Ereunetes pusillus.* SEMIPALMATED SANDPIPER.—This was the only other species of shore

bird, at the temporary ponds in 1936 (*see under* Semipalmated Plover), which remained after the end of May. A few were still to be found on June 8; five or six were noted in a field near Laskay on June 10, 1937.

**Larus delawarensis.* RING-BILLED GULL.—Occasional transient birds have been observed in early August at the lower Holland Marsh and at Nancy Lake Farm.

**Hydroprogne caspia imperator.* CASPIAN TERN, —The only record of this species concerns a bird seen flying over Nancy Lake on July 18, 1938, by Messrs. Fred Barratt and Frank Cook.

**Childonias nigra surinamensis.* BLACK TERN. —One was observed at the old Holland River, in the drained marsh on June 25, 1937. Later, the same year, Mr. D. A. Ross and the writer found a colony of at least fifty pairs in the undrained marsh below Bradford. On July 7, a few immature birds were seen on the wing and adults were carrying food. A search for nests proved unsuccessful. An adult was seen feeding an immature bird, fully grown, at a pond west of Aurora on July 28. They had probably commenced migration. During a visit to the marsh on August 2, not a single tern was seen. Mr. D. A. Ross found a pair during the same summer at Thompson Lake in the south-east corner of King Township.

On June 9, 1938, a visit to the lower marsh with Mr. W. V. Crich, resulted in the discovery of three nests containing three, three, and one egg respectively. Mr. Crich found a nest with two young on June 18. The nests were all located well back from the river on fairly firm open marsh, amidst short, rather sparse, vegetation. By July 22, all the terns had apparently left this area.

**Ectopistes migratorius.* PASSENGER PIGEON.—This extinct species is included for the sake of completeness; Mitchell (1935) gives details of their former occurrence in the township.

Coccyzus americanus americanus. YELLOW-BILLED CUCKOO.—On June 17, 1929, a nest of this cuckoo was found eight feet up in alders overhanging the margin of Nancy Lake. At least one egg was in the almost inaccessible nest. On June 29 one or more young were hatched. This is an uncommon summer resident and has not been observed every year. Snyder (1930) gives one record.

Asio wilsonianus. LONG-EARED OWL.—Two additional records of this species are known. Three were seen about dark, on July 9, 1938, in the tamarack-spruce bush along the drainage canal, by Mr. O. E. Devitt and the writer. Two of these had the appearance of being immature birds. One was heard on the evening of July 6, 1932, by C. H. D. Clarke at Pottageville and he reports one, possibly the same individual, seen in the early evening of July 10 and heard hooting.

Antrostomus vociferus vociferus. EASTERN WHIP-POOR-WILL.—Appears to have become less common in recent years. The Museum's survey in 1926 recorded the species as fairly common and breeding. During a week spent at Kettleby Kabin in late June, 1937, none was heard, not have they been noted here on various overnight visits in the past few years. At Nancy Lake Farm the only summer record is that of one heard on June 19, 1936.

Chordeiles minor minor. EASTERN NIGHTHAWK. —This species, in common with the Whip-poor-will, has become much less common during the summer months.

During the summers of 1929 to 1931, inclusive, a few were noted at Nancy Lake Farm. In 1932, practically none were seen. In subsequent years not one has been observed during the breeding season. The species appears in small numbers in August, usually, but occasionally they are not noted until early September.

Archilochus colubris. RUBY-THROATED HUMMINGBIRD.—Breeding records may now be given for this species, whose occurrence status does not appear to have changed since 1926. Mr. D. A. Ross showed the writer three nests in the summer of 1937, two at Nancy Lake and one near Laskay. All were situated in beeches at elevations of from twenty-five to thirty-five feet. Young birds were observed in one nest on July 18.

**Ceophloeus pileatus abieticola.* NORTHERN PILEATED WOODPECKER.—The reappearance in the township of this interesting species, (not present in 1926), in the fall of 1932, has already been recorded. (Ussher, 1936). It has now become well established, and is present in small numbers in many of the larger wooded areas. Mr. Archie Gillies, a former resident, informed the writer in 1938, that he remembered seeing these birds in the vicinity of Kelly and Nancy Lakes, "forty years ago".

The first nest recorded for the Toronto region was found at Pottageville in 1935 (Ussher, 1937) A second was located near Nancy Lake Farm in April of 1937. The cavity was some forty feet up in the top of a large dead hemlock stub. Young were first heard on May 28 by Mr. O. E. Devitt. They left the nest about June 15.

Empidonax flaviventris. YELLOW-BELLIED FLYCATCHER.—An example of this species, presumably a migrant, was noticed at Nancy Lake on

June 1, 1929. Returning birds have been recorded as early as August 2 (1936) and August 5 (1930).

Empidonax minimus. LEAST FLYCATCHER.—The Museum's party found this flycatcher established as a rather uncommon breeding bird in 1926. It appears to be less common in summer during recent years. The writer has only one summer record, at Nancy Lake on June 4, 1937. Several trips through apparently suitable habitat in the Holland swamp, during 1937, failed to produce any birds.

Nuttallornis mesoleucus. OLIVE-SIDED FLYCATCHER.—The exact status of this species is still uncertain; two July records in 1926 led Snyder (1930) to suggest "that the species may be other than a migrant in the township". It is possible that the species may yet prove to be a rare breeder in the Holland swamp where a bird was seen on July 31, 1937. An individual was noted at Nancy Lake as late as June 28 in 1935.

Otocoris alpestris praticola. PRAIRIE HORNED LARK.—This is a moderately common breeder throughout the farming areas. The single record of a lone bird in the summer of 1926 (Snyder, 1930) suggests that the species was less common then than now.

A nest at Nancy Lake Farm, found on June 20, 1938, was of rather unusual interest; it was situated in a field of potatoes, well sunk into the ground in the shade of a potato plant. The two eggs were lying on top of a small toad, which completely filled the bottom of the nest. The next morning there were three eggs, but no toad. It is remarkable that the intruder got into and out of the nest without breaking the eggs.

Petrochelidon albifrons. CLIFF SWALLOW.—Snyder (1930) mentions one record for late August. This swallow is still of very rare occurrence during the summer months. It has been noted at Nancy Lake Farm only twice in June and once in July. It usually appears in small numbers in early August. The only indication that it may breed, was the actions of a pair seen on June 29, 1934, at Nancy Lake. They were apparently looking for a nesting site under the eaves of a barn.

Sitta canadensis. RED-BREASTED NUTHATCH.—The finding of scattered individuals in the Holland swanp during 1926, was one of the surprises of the Museum's survey. The species may be of regular occurrence there, as one or two were noted on two occasions in the summer of 1937.

In 1938, following an unusually heavy winter population in the immediate area, at least one pair bred at Nancy Lake,—the first nest to be reported for the Toronto region. It was located about thirty-five feet up in a small dead black ash. When found on April 26, it was under construction and contained young birds on May 22; on this date the male took food to the female in the cavity. The entrance to this was smeared with pitch, and on June 19 a bird was observed apparently gathering this material from a green cone of white pine.

Telmatodytes palustris dissaeptus. PRAIRIE MARSH WREN.—As was found by the Museum's survey, this wren is quite common along the Holland River. This is especially so for the section below Bradford, where they are established where cat-tails are present. A nest with three eggs, found on June 11, 1937, was located in reed grass instead of the almost universally favoured cat-tail. A new breeding station with only a few pairs was found at Mary Lake, where a newly completed nest was observed on June 3. The species was also present along a marshy creek near Pottageville.

Cistothorus stellaris. SHORT-BILLED MARSH WREN.—Several breeding records have been established since 1926, and a few new stations, other than those previously recorded (Snyder, 1930). A nest found in the Holland Marsh by Mr. D. A. Ross on June 25, 1937, contained the usual complement of five eggs. The young left on July 18, on which date Mr. F. A. Barratt collected a set of five eggs nearby (now in the R.O.M.Z., Baillie and Harrington, 1937). This wren was also found breeding at a marshy creek near Pottageville where young on the wing were observed on July 31, 1937. Other stations occupied in that year were at Hall's Lake, King Creek, and Mary Lake Farm. The species is probably erratic from year to year.

Toxostoma rufum. BROWN THRASHER.—This bird is still unusually rare in the township. The only breeding record to date is a nest four eggs, found on the ground in a bushy fence line at Nancy Lake Farm, by Mrs. H. M. Halliday, on June 2, 1935.

Hylocichla mustelina. WOOD THRUSH.—A moderately common breeder but of rather irregular distribution It is present in damp woods bordering the upper Humber River, near Laskay and also on parts of the central ridge. These are new stations, previously unrecorded. A nest in a small hemlock, under hardwoods on the ridge, contained four eggs which hatched on June 22, 1937; the same pair (judging by the location) had a second set of there eggs on July 27.

Regulus satrapa satrapa. EASTERN GOLDEN-CROWNED KINGLET.—The first nest for the Toronto region was discovered in the Holland swamp on June 12, 1937. It was situated in a clump of black spruce and contained five small young birds. The species was observed in similar habitat during 1938. A dense stand of cedar and balsam fir bordering a spring creek, in the south part of Concession X, was also inhabited by at least one pair in 1937.

**Corthylio calendula calendula* EASTERN RUBY-CROWNED KINGLET.—A singing male was noted on June 10 and 18, 1939, in a spruce-tamarac bog on the south side of the Holland River marsh between the VIth and VIIth Concessions by Mr. Baillie.

**Vireo flavifrons.* YELLOW-THROATED VIREO.—A rare summer bird, probably of irregular occurrence. A singing male was noted at Nancy Lake on June 20 to 28, 1931; another was seen here on August 21, 1932. These appear to be the only summer records.

**Vireo gilvus gilvus.* EASTERN WARBLING VIREO.—The only known station is the village of King City, where a few pairs are regular summer residents

**Vermivora chrysoptera* GOLDEN-WINGED WARBLER.—The species has been recorded once in mid-August from Nancy Lake Farm (Ussher, 1931). In 1937, Mr. D. A. Ross noted a male bird in a cut-over part of the central ridge, between May 30 and June 21.

Vermivora ruficapilla ruficapilla. NASHVILLE WARBLER.—This warbler appears to be mainly confined to the Holland swamp where it was found breeding in 1926. South of the ridge, at Nancy Lake, it is present only during migration.

**Dendroica magnolia.* MAGNOLIA WARBLER.—A male bird was seen by Mr. D. A. Ross on the main ridge on June 10, 1937. In the tamarack-black spruce stands of the Holland swamp, a singing male was noted several times in June of that year. In 1938 several birds, all males in song, were observed in this habitat and on June 10 and 18, 1939, Mr. Baillie again noted the presence of a singing male in the bog which harboured the Ruby-crowned Kinglet.

**Dendroica caerulescens caerulescens.* BLACK-THROATED BLUE WARBLER.—A lone singing male was present in the woods around Nancy Lake throughout the summer of 1938. Judging by its wide wanderings, the bird was an unmated individual.

Dendroica coronata. MYRTLE WARBLER.—Additional records of this species are as follows: An individual seen at Nancy Lake Farm on August 4, 1933, and a female at the same place on July 17, 1934. A singing male was observed in the tamarack-black spruce stands of the swamp on June 28, 1937.

Dendroica cerulea. CERULEAN WARBLER.—A record in addition to the specimen collected by the Museum's party in 1926, is that of a singing male observed in the tops of large elms south of Nancy Lake Farm, on June 23, 1927.

Dendrocica fusca. BLACKBURNIAN WARBLER.—Breeding records for this warbler are now established from two localities. A young bird, being fed by adults, was watched at Nancy Lake on August 18, 1929; young have also been noted here, in 1931, and 1934 (Ussher, 1936). Mr. D. A. Ross, on June 15, 1937, saw a nest in a hemlock near Laskay. This is apparently the first to be recorded for the Toronto region.

**Dendroica castanea.* BAY-BREASTED WARBLER.—One occurrence of early fall migrants was noted at Nancy Lake, on August 18, 1929. The species does not usually appear before September.

**Dendroica pinus pinus.* NORTHERN PINE WARBLER.—The species is present, in small numbers, in a few localities where white pine occurs in nearly pure stands. It has been recorded as breeding in 1934 at Nancy Lake Farm (Ussher, 1936). A male bird in the same woods was watched while attending a two-thirds grown young, on July 7, 1938.

Seiurus noveboracensis noveboracensis. NORTHERN WATER-THRUSH.—Snyder (1930), records the first breeding evidence for the Toronto region, when young birds were taken in the Holland swamp. Subsequently Mr. H. H. Southam found a nest with four eggs at Pottageville, on May 24, 1935. Nests have also been found at Nancy Lake and the species is quite common at most of the lakes, and in low-lying woods.

**Oporornis agilis.* CONNECTICUT WARBLER.—The only summer record is that of a bird, undoubtedly a migrant, observed at Nancy Lake on August 21, 1935.

Oporornis philadelphia. MOURNING WARBLER.—Mr. D. A. Ross showed the writer a nest with four eggs, at Nancy Lake on June 19, 1937. It was located about six inches off the ground, in the base of a fern clump, growing under hemlock. This inhabitant of cut-over areas and forest openings may be somewhat more common now, than in 1926.

Wilsonia pusilla pusilla. WILSON'S WARBLER.—Returning migrants appear regularly during the last week in August and have been noted at Nancy Lake as early as August 17, 1937.

Agelaius phoeniceus phoeniceus. EASTERN RED-WING.—No colonies of this species have yet been established outside of the usual cat-tail habitat (Snyder, 1930). Individual nestings

which vary from this rule are, however, noted occasionally. Two nests found in the undrained marsh, on June 9, 1938, were in short grassy habitat, being placed only six and eight inches up respectively. About the lakes and sloughs, nests are not infrequently placed in alder, willow, red-osier dogwood, and cassandra. The highest location noted was seven feet up in small willows.

Piranga erythromelas. SCARLET TANAGER.—This species is not uncommon in the dry woodlands along the ridge, where it was noted in 1926. Hemlocks appear to be favoured as nesting sites; three nests located by Mr. D. A. Ross and the writer, in the area north of Kelly Lake, in 1937, were in these trees. A fourth was placed in a maple sapling. The first of these, contained four eggs on June 10.

Spinus pinus pinus. NORTHERN PINE SISKIN.—The nest recorded by Snyder (1930) remains the only breeding evidence for this species. It has not been unusual to find small flocks of Siskins, well into the latter half of May, six weeks or more later than the nest referred to. The only summer record is of a bird seen flying over Nancy Lake on July 23, 1933.

**Ammodramus savannarum australis.* EASTERN GRASSHOPPER SPARROW.—Two were noted near Pottageville on June 15, 1925, by Messrs. R. V. Lindsay and C. D. Richards. A singing male was located in a clover field at Nancy Lake Farm during the last week of July and the first week of August, in 1934.

**Passerherbulus caudacutus.* LECONTE'S SPARROW.—A colony of these elusive birds was found at the Holland Marsh, in late June 1937. They were located in fairly open habitat towards the centre of the marsh. The birds could be detected to the best advantage after dark, when, from one spot, as many as four or five could be heard. They may be generally distributed in this type of habitat, as a few were discovered, though only on the Simcoe County side, in the undrained part of the marsh, north-east of Bradford (Devitt, 1938). This sparrow was established as a breeding bird on July 23, 1938, when Mr. O. E. Devitt took a young bird, just out of the nest and barely able to fly. This is the first evidence that the species breeds in the Toronto region, It seems probable that it has come in quite recently.

**Passerherbulus henslowi henslowi.* WESTERN HENSLOW'S SPARROW.—This species was first noted in the township by Mr. S. L. Thompson who heard one in a small marsh near Kettleby on July 11, 1936. In 1937 they were found in small numbers associated with Leconte's Sparrows in the Holland Marsh. One was also noted on June 25, 1937, in another part of the marsh. The advent of this species since 1926 may be associated with the altered drainage.

Junco hyemalis hyemalis. SLATE-COLORED JUNCO.—This species is usually found on the dry ridges as noted by Snyder (1930); occasionally they are seen elsewhere in summer. Breeding evidence can now be added. A family of nearly fully grown young was observed being fed by adults, in a white pine stand, at Nancy Lake Farm on July 17, 1934. An uncompleted nest was found by a creek, in the same area, on May 8, 1935.

AMPHIBIANS AND REPTILES.

**Rana catesbeiana.* BULLFROG.—This is the only amphibian which can be added to the list recorded by Logier (1930). Many young bullfrogs were noted on August 22, 1928, at Thompson Lake in Concession X, by Messrs J. L. Baillie, and W. J. LeRay. One adult was seen at the same place. Specimens of this frog were examined at Nancy Lake by Mr. D. A. Ross and the writer in June, 1937.

Rana palustris. PICKEREL FROG.—A second station for this species is at Nancy Lake Farm. Six specimens were collected from a vat of flowing spring water in a milk house on December 27, 1938, by Miss Rosemary Martin, Department of Biology, University of Toronto. They had first been noticed in the vat during late November.

**Diadophis punctatus.* RING-NECKED SNAKE.—A specimen of this small reptile was captured by Mr. W. J. LeRay in June of 1935, the initial record for the township. The snake was discovered in a pile of partially decayed bark on the VIIth concession just east of Kelly Lake.

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REVIEW

CONTRIBUTIONS OF THE ROYAL ONTARIO MUSEUM OF ZOOLOGY, NO. 14. *A Faunal Investigation of Western Rainy River District, Ontario By L. L. Snyder. Reprinted from Transactions Royal Canadian Institute, Vol. XXII, Part 1, 1938. Published under The Reuben Wells Leonard Bequest. Toronto: 1938. pp 157-213, map 1.*

A general Introduction, pages 157-164, gives a description of the area covered by a field party of the Royal Ontario Museum of Zoology between May 31, and August 10, 1929. The area consists of approximately 1400 square miles. It is bounded on the south by Rainy River which constitutes the Minnesota-Ontario International Boundary, on the west by Lake of the Woods, which lies on the Manitoba-Ontario Provincial Boundary, on the east and north by Rainy Lake and the system of lesser lakes which mark the border of exposed pre-Cambrian rock in the region. The trees and shrubs are fairly typical of the eastern section of the Canadian life zone, and the record of vertebrate animals demonstrates also that the composite association of forms in this region is largely characteristic of the Algon quin faunal area of the Canadian life zone. So far as known no comprehensive studies or surveys had been made of the biota of this area. In bird collecting Mr. Snyder was assisted by Mr. James L. Baillie, Jr., while Mr. H. P. Stovell did the major portion of the mammal collecting.

The list of mammals of the district, pages 165-180, is mostly based on series of 25 species collected, but some of the fur-bearers and larger mammals are included on other evidence, raising the total number of species to 44. Owing to the inadequacy of local collections of mammals from, other large areas in the Province of Ontario which would be necessary in making a satisfactory critical determination of subspecific characters, the author has found it inadvisable to give more than names of *species*. However, in many instances he has given interesting and pertinent notes on differentiating characters which give the reader a chance to form his own opinion on some moot questions, and may possibly weaken his acceptance of certain presumptions on range of subspecies which at the present time rest on inference rather than fact. That is to say, that in the range of a number of species there is a wide no-man's-land between the records of eastern and western, or northern and southern subspecies, where there are few if any authentic specimens available to mark the line of separation Other difficulties in separating subspecies may be due to having to compare specimens which are taken at different seasons.

The reviewer deprecates the lumping of measurements of series of mammals as "adults" without giving sex. We know that there are usually considerable differences between sexes of Ungulates, as well as in Carnivores (particularly in *Mustelidae*, weasels, etc.), and the best modern practice is to give averages (preferably with maximum and minimum measurements) of a series of males and females separately, leaving out specimens which are evidently juvenile or subadult.

The author states that "There is no doubt that the fauna of the Rainy River District is the richest and most varied of any area visited so far during the prosecution of the Museum's surveys." A series of Franklin's Ground Squirrel, *Citellus franklinii*, was collected near the town of Rainy River, constituting the first collection of the species in the province of Ontario. Information was also obtained to the effect that the White-tailed Jack Rabbit, *Lepus townsendii*, is found on Sable Island, off the mouth of Rainy River, but no specimens were taken by the party. Taken altogether this report is a valuable addition to the list of faunal papers of Canada.—R.M.A.

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VOL. LIII OTTAWA, CANADA, NOVEMBER, 1939 No. 8

FRANCIS ROBERT LATCHFORD

1856 - 1938

The death last year of Chief Justice Latchford marks the end of an era in Canadian Conchology. While he lived there was a link between the "new recruits" and the "old guard" for Latchford knew personally or by correspondence most of the pioneers not only of Canadian but also of American Conchology. His personal friends included Bryant Walker, the Reverend Mr. Taylor, A. W. Hanham and many more; to name his correspondents would involve enumerating most of the American Conchologists of the latter half of the nineteenth century. We count ourselves fortunate to have known this grand old man and to have listened to his tales of collecting in earlier days.

First let us set down the milestones of his life and then attempt to fill in the picture with stories from our acquaintance with him. Francis Robert Latchford was born of Irish parents in the village of Aylmer, Quebec, some ten miles west of Ottawa, on the banks of the Ottawa River. His birthplace was to have an important bearing on his life; Aylmer, though English in name had, and still has, a population about equally divided between French and English Canadians; in the 1860's and 1870's it had a number of inns much frequented by the lumbermen going to or from the lumber camps on the upper Ottawa. Here Latchford learned French as well as English and all his life spoke both fluently. Here he learned to know the rough and sometimes boisterous lumbermen and later had many a story to tell about the bush and the lumber camps.

Early in life he showed promise and as a student at Ottawa University he won medals and awards for English and Latin essays, Christian doctrine and Science. He graduated from the University of Ottawa in 1882 and continued his studies in law, became a barrister in 1886 and a Queen's Counsel in 1899. He practised in Ottawa where he became a leader in his profession.

Politics soon attracted him and in 1899 he was elected as a member of the provincial parliament for South Renfrew, retaining that seat until 1905, being successively appointed Commissioner of Public Works and Attorney-General. In 1908 he was appointed a judge of the Supreme Court of Ontario, which position he held until his death. But his public duties did not end there; under his stimulus the Temiskaming and Northern Ontario railroad was pushed to completion and one station on this railroad bears his name. The construction of the T. & N.O. opened up the rich mining regions of Northern Ontario; the names of its stations alone conjure up pictures of vast mineral wealth: North Bay, Cobalt, Cochrane; mine after mine delving into the pre-Cambrian Shield for precious metals.

A man with such a full life might be forgiven for not having many hobbies; but Latchford found time during his busy career for natural history, hunting, golf and the study of Canadian and Irish history.

In natural history we know him best as a conchologist but he also had a surprisingly wide knowledge of botany and ornithology; his hunting and fishing were not mere slaughter but, as a fellow hunter of his told one of us, he hunted and fished like a gentleman, confining himself to a decent bag. His interest in conservation led to his election as President of the North American Game Protective Association in 1902.

In the field of history his contributions were numerous and his knowledge encyclopaedic. A few years before his death he was elected President of the Catholic Historical Society of Canada.

We come now to a facet of his varied career which was the link which brought us into con-

tact with him. Both of us, in our earlier conchological gropings had come across the name of Latchford but we unconsciously thought of him as one of the long-departed pioneers. It was a pleasant shock, therefore, to find that F. R. Latchford was very much alive and active and willing to become counsellor and friend to struggling young shell-hunters. As we came to know him better, in his own home, in the field and through letters, our admiration for him grew and we drew more and more from his knowledge of Canadian Mollusca.

Even before his admission to the Bar he was interested in Mollusca and had become a leader of the Conchological Branch of the Ottawa Field-Naturalists' Club. The reports of the Branch contain and represent much of the information on which the 1890 list of Ottawa shells was based and represent much painstaking and enthusiastic work. His travels took him to Niagara and to northern Ontario where he collected shells, as may be seen by glancing through the list of his papers. After his elevation to the Bench his duties took him all over the province and as always he collected wherever he went. He used to enjoy telling us of his Jekyll and Hyde existence: surreptitious morning excursions in old clothes and waders to river and woods and dignified afternoons on the Bench in black silken gown. It was always a gala occasion when his work brought him to Windsor. When court adjourned for the day he would cross to Detroit and spend the evening with Bryant Walker, talking about shells. These conchological sessions often lasted far into the night. Sometimes, no doubt, the court officials noticed next morning that the judge would conceal many a yawn behind an ample judicial sleeve; no doubt they drew their own conclusions about the cause but it is safe to say that their guesses were wide of the mark. Possibly they would have done better had they known that His Honour's pockets were bulging with duplicates heaped upon him by the ever-generous Bryant Walker.

Two legal characteristics, a keen memory and an orderly mind served him well in conchology. Furthermore he was no seeker of rarities or showy specimens; but rather a keen observer able to appreciate the apparently drab and commonplace shells characteristic of Canada. Those ubiquitous and often tedious shells, the pearly mussels, finger-nail clams, planorbids, lymnaeids and physids were his special concern. His published papers and his collection, now in the Royal Ontario Museum of Zoology, reflect this interest. Given a different background, he would have made an excellent experimental scientist; the varieties of our common molluscs stimulated him to many ingenious but unpublished theories. When he turned to the law Canada gained a great jurist but lost a potential scientist.

He did manage, however, to publish a number of papers surprising for one so busy; these have appeared mostly in the publications of the Ottawa Field-Naturalists' Club, of which he was a member for some sixty years. The appended bibliography includes all those known to us, but we would be grateful for information concerning any others which we may have overlooked.

Chief Justice Latchford died at Toronto, August 13th, 1938, at the age of 82. His death caused widespread regret and called forth messages of appreciation and sympathy from men in all walks of life, extolling his qualities and achievements, but he could have had no better epitaph than the words applied to him some thirty years ago by Sir George W. Ross: "An able, upright, industrious and painstaking judge."

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A. LA ROCQUE
J. OUGHTON

SOME SNAILS FROM THE LOWER ST. LAWRENCE VALLEY AND OBSERVATIONS ON THEIR BIONOMICS

By HENRY J. GRIFFITHS

DURING the course of an investigation on the intermediate host of *Fasciola hepatica*, the Liver Fluke of sheep, a number of observations were made on the bionomics of the molluscs collected. These observations are presented in the following paragraphs and may be of use to those who, at some time or another, may desire to raise snails in the aquarium for experimental purposes. The molluscs, which were numerous at all seasons, were collected in the vicinity of Montmagny and St. Pierre Montmagny, P.Q., and through the kindness of Mr. A. La Rocque of the National Museum of Canada, and Dr. F. C. Baker, of Illinois, the following shells were identified:

Helisoma infracarinatum (Baker)
H. antrosum (Say) var. *unicarinata*
Stagnicola palustris elodes (Say)
Physa gyrina (Say)
Amnicola sp.
Fossaria obrussa (Say)
Succinea retusa (Lea)
F. obrussa exigua
Cochlicopa lubrica (Müll.)
F. umbilicata
Stagnicola palustris var.

On exposure to miracidia of *F. hepatica*, no stages of intramolluscan development were observed on any occasion and none of the above species was implicated as vector of this trematode.

Before attempting to implicate a mollusc as intermediate host of a trematode, it is desirable to have a knowledge of the biology of the snail suspected. In the field, it is necessary to investigate its habitat over a considerable period of time, while in the laboratory the molluscs must be kept under as nearly natural conditions as possible. To prove a certain mollusc to be the vector of any helminth, it is desirable to infect pest-free molluscs and observe within them, all stages of intra-molluscan development. This can only be accomplished by the use of individuals that have been laboratory-reared and have had no previous opportunity of being infected. The adult parasite must then be developed in a laboratory-bred definitive host as a result of feeding the infective stages obtained from the suspected intermediary.

Information regarding propagation of snails is scanty and there are many obstacles and numerous difficulties to rearing molluscs in captivity. A room in which the air tempera-

ture can be regulated so that fluctuations are not too wide, is necessary. Battery jars make very suitable aquarium tanks and aeration may be supplied by electric or water-driven pumps.

Filtered river water or ordinary tap water were found equally satisfactory in aquarium tanks. Chlorinated tap water was not found detrimental in any way, though it was found advisable to allow the water to stand for several hours prior to introducing molluscs or making up new aquaria. When changing the water, only half was siphoned off and then replaced with fresh water. Tanks should always be balanced as well as possible with a sand or dirt bottom and a suitable amount of vegetation. Some of the Lymnaeas require shallow water and mud flats on which to rest, their habits being somewhat terrestial.

Heavy losses may usually be attributed to a combination of the following factors:

1. An unbalanced aquarium.
2. Lack of dirt and decomposed organic matter.
3. Too frequent changes of water.

For the welfare of the mollusc, it is essential that the balance within the tank resemble, as nearly as possible, the habitat as it would be found in nature, as molluscs appear to be very susceptible to any unnatural conditions. Algae, oxygen and crustacea appear to be necessary, while some decomposing organic matter is essential, especially if no other form of food is available. Weeds and water plants are desirable and all assist oxygenation and the production of a natural equilibrium. The contents of the aquaria should be clear at all times; cloudiness is an undesirable sign and indicates that some factor is out of proportion and a natural balance not being maintained.

Too frequent changes of water in tanks will furnish too unbalanced an environment for the snail and heavy mortality may result. On the other hand, any snails or other animals which die, should be removed from the aquaria immediately. The excessive decomposition of any animal matter within the tanks causes the formation of some products very toxic to the remaining inhabitants of the colony. Without a doubt, the aquaria can be kept too "clean". Snails relish debris but it must be clean and wholesome and not as supplied by a mass of putrescent material. At times, water in tanks may remain unchanged for a period of eight or ten weeks, water being added when necessary to make up loss due to evaporation. The human nose was found to be the best indicator in determining when water in tanks should be changed. Whenever the slightest disagreeable or offensive odour is liberated from the tank, the water should be changed and the tank cleaned. This odour is characteristic and with little experience is easily recognizable.

Small blocks of calcium sulphate (plaster of Paris) should be kept in tanks as an available supply of calcium for shell growth. Food should be supplied at varying intervals depending on the algal growth and water plants available in the tanks. Lettuce makes a very suitable and easily obtainable source of food, either raw or dried, preferably parboiled for the young.

Considerable difficulty may be experienced in the breeding and rearing of successive generations of snails. Presumably environmental factors regulate growth, oviposition and influence other physiological processes. It is possible that certain unknown factors may be lacking in the aquarium tank which may reduce the normal rate of oviposition. It has been observed frequently that adult snails may be stimulated to oviposit by being placed in a different tank and thus exposed to slightly different environmental conditions. On the other hand, second generation juveniles have shown a very definite negative reaction to being placed in fresh tap water, the mortality being very high. When placed in filtered water from stock tanks, the lethal factor was absent and the young flourished.

During periods of exceptionally dry weather, when streams and ponds dry up, it is well known that many of the Lymnaeas may bury themselves in mud to the depth of several inches, cover their aperture with an epiphragm and remain quiescent until the return of favourable conditions. In consideration of this adaptation, it was necessary to search for snails or empty shells, in many areas which were marshy during spring and the late fall and dry the rest of the year. Soil was dug up and the bases of tufts of reed-grass were examined, but on no occasion were any aestivating or empty shells encountered.

Considering the low temperatures experienced during the average Canadian winter, it is interesting to note how molluscs adapt themselves to such climatic conditions as the cold of the winter of 1933-34. A number of *Stagnicola* spp. and *Physa* sp. were placed in an old metal sink with sand and rocks to a depth of two or three inches in the bottom; river weeds were planted in the sand. The tank was placed outside on a northern exposure and consequently was not subject to thawing and freezing. In spring, several of the snails were found to have perished, but some withstood the rigours of winter and returned to normal activity as soon

as the water warmed up. It would seem likely that under these experimental conditions there was probably insufficient depth of sand and debris to permit natural and satisfactory hibernation. In the stream or pond the snail would be able to descend to a greater depth and remain at these levels until water temperature and other factors are suitable for emergence. In the field, it is of great interest to observe how very soon the molluscs become active after the snow has melted in spring. They appear in temporary pools as soon as the water shows signs of warming up and from the first signs of activity but a short time elapses before egg-laying commences.

ON THE OCCURRENCE OF THE TERRESTRIAL ISOPOD Androniscus dentiger, IN CANADA

By J. C. MEDCOF

DURING the past four years the writer has collected samples of a small brilliantly orange-coloured terrestrial isopod from greenhouses in Ontario and Quebec. Dr. W. G. Van Name of the American Museum of Natural History examined some of these and, with fair certainty, identified the form with the European species, *Androniscus dentiger* Verhoeff, although he had only published figures and descriptions to aid in the determination. Later, specimens were sent to Dr. K. Stephensen of the Zoological Museum of the University of Copenhagen, compared by him with those of European collection and positively identified as *A. dentiger*.

The following are the localities from which specimens were taken.

London, Ontario, January 28, 1935; from the moist floor of Mr. Good's private greenhouse, under a flower pot; 1 specimen.

December 10, 1935; from the same place; 20 specimens.

Toronto, Ontario, January 10, 1936; from the moist floor of the Botanical greenhouses of the University of Toronto; 8 specimens.

June 5, 1936; from the bulb cellar of Slicters' (Florists) greenhouses; 6 specimens.

December 29, 1936; from the Allen Gardens greenhouses, on the moist floor of a dark room; 30 specimens. This is only one of several extensive collections the writer has made from the Allen Gardens. The isopod always has been more abundant there than on any of the other collecting grounds visited.

Montreal, Quebec, January 7, 1939; from the moist floor of the botanical greenhouse of McGill University; 6 specimens.

To the best of the writer's knowledge this is the first record of *A. dentiger* in North America. Considering the habits of the animal in Europe and the extent of the traffic in greenhouse plants between Europe and North America, finding the species here is hardly a surprise. It is an inconspicuous form and may be carried about easily. The prevalence here has seemed to warrant the publication of these observations.

Samples of the collections have been deposited with the Royal Ontario Museum of Zoology, Toronto, Canada; the American Museum of Natural History, New York, U.S.A.; and the Zoological Museum of the University of Copenhagen, Denmark.

The writer wishes to thank Dr. Van Name and Dr. Stephensen for their co-operation in this study.

SOME RECENT BIRD RECORDS FROM THE GASPE PENINSULA, QUEBEC

By HARRISON F. LEWIS

AMONG my observations of birds during a visit to the Gaspé Peninsula, Province of Quebec, in the period, November 4th to 9th, 1938, the following appear to be of sufficient interest to warrant their publication.

1. *Colymbus grisegena holboelli*. HOLBOELL'S GREBE.—While passing in a small boat in front of the cliffs of Bonaventure Island, near Percé, on November 7, 1938, I saw two Holboell's Grebes on the water near the foot of the cliffs. They were observed at short range through X6

binoculars as they swam on the quiet surface of the sea. Their size and form and their characteristic color pattern were clearly seen, rendering their identification certain. This is the first record of Holboell's Grebe in the region of the Gaspé Peninsula, where no other Grebe has yet been recorded.

2. *Zenaidura macroura carolinensis.* EASTERN MOURNING DOVE.—A Mourning Dove was clearly seen and identified beside the highway at the west end of Percé village on November 7, 1938. This is the second record of this species in the Gaspé Peninsula, the first being that of a small flock of Mourning Doves observed at Grande Grève by Mr. P. S. Hotton in September, 1936, as recorded by Stanley C. Ball (*Can. Field-Nat.*, 52:100).

3. *Mimus polyglottos polyglottos.* EASTERN MOCKINGBIRD.—On the afternoon of November 5, 1938, I was a passenger in the front seat of an automobile that was passing through the rural community known as York Centre, which is near Gaspé village, but is on the south side of the estuary of the York River. Suddenly a strange gray bird flew past the automobile in which I was riding and perched in the top of a spruce tree near the roadside. Suspecting its identity because of the general impression that I had obtained, I asked the driver to stop the automobile and then, proceeding on foot, followed the bird about the neighboring fields for about ten minutes. While the bird flew occasionally from one tree to another, it was not unduly restless or timid and I succeeded in obtaining several excellent views of it in bright sunshine at distances varying from 25 to 30 feet. I used X6 binoculars and noted the following details. The bird was about the size of a Catbird, and apparently of the same family. Its form and manner, especially the way in which it carried its tail, reminded me more of the Brown Thrasher than of the Catbird. Its upper parts were rather light and uniform gray. Just in front of the eye was a small, ill-defined area of slightly darker gray, and just behind the eye was another such area, giving the impression of an indistinct dark line through the eye. There was a very narrow white eye-ring, or at least a partial eye-ring. The closed wings showed two rather narrow and widely-separated white wing-bars in each wing. A few of the coverts immediately above the upper white wing-bar appeared to be darker than the rest of the wing. When the bird was in flight, each wing exhibited a large white area. The tail was gray, but its upper surface was darker than the bird's back. When the tail was cocked up, as it was from time to time, I could see that its under surface, from the under tail-coverts nearly to its tip, was very light in color. The bird's under parts were of a uniform very light buffy, or white with a buffy wash. The bill was dark, slightly decurved, and apparently half an inch, or a little more, in length. I could not doubt that I was observing a Mockingbird.

The bird was lively and seemed to be in good health. It was not heard to utter any sound. At one time it flew into a leafless mountain ash tree that was heavily loaded with ripe berries, of which it ate a few. Finally it flew away to the top of a distant white pine.

There appears to be no previous record of the Mockingbird in the Gaspé Peninsula. I have been able to find, indeed, published records of only two previous occurrences of the Mockingbird in the Province of Quebec.

C. E. Dionne, in his well-known work, "Les Oiseaux de la Province de Québec" (Quebec, 1906), states (page 381): "Dr. Schmitt showed me a specimen killed August 8, 1903, at Anticosti, and Mr. Comeau told me that he had killed one at Godbout the same summer; these are the only known instances of its occurrence in our province." (Translation from the French text of original).

It is possible that the Mockingbird found at York Centre in 1938 had been carried to eastern Canada by one of the severe wind storms that moved northward in eastern North America in the autumn of that year.

4. *Calcarius lapponicus lapponicus.* LAPLAND LONGSPUR.—At Paspebiac, on November 9, 1938, I saw a group of eight Lapland Longspurs on a flat, shingly point. They were near a large flock of Snow Buntings, but remained a little apart from them. De Mille (*Auk*, 43:521) has recorded this Longspur on the north side of the Gaspé Peninsula in spring, but it does not appear to have been recorded previously from the peninsula in autumn.

REPORT ON WOLVES* FOLLOWED DURING FEBRUARY AND MARCH, 1939

By A. L. DUNNE

NOTE—For the purpose of learning more about the habits of wolves in Algonquin Provincial Park, Ontario, Superintendent F. A. MacDougall instructed Rangers Dunne and Heintzman to search for wolf tracks and follow them as far as possible. We are indebted to Mr. MacDougall for this report, forwarded by Professor J. R. Dymond, Director of the Royal Ontario Museum of Zoology, Toronto.—Ed.

Geo. Heintzman and I followed wolves on several occasions during February and March, 1939, but, due to snowstorms and drifting snow, we lost their tracks after one or two days' travel. There were from 8 to 10 wolves in each pack followed. We checked their tracks in a number of places and are quite sure of this. When the travelling was bad in the bush they would walk in each other's tracks and it would look as if there were not more than three or four wolves, but the whole pack was walking in the same track.

Due to fresh snow we were able to judge with fair accuracy the time of day or night when the wolves had travelled. We found that where they had travelled during daylight they usually climbed high open hills along their route of travel, where observation was good from the top. Some of the hills were so steep that we had to take off our snowshoes to get up or down. The high bare hill on the North Branch, north of Onaway Lake is one example. On top of these hills we could see where they had been playing around and sometimes lying down for some time. During the day they kept away from lakes more than at night, sometimes travelling around the shores rather than cross them. However, when travelling at night they did not climb hills, but followed lakes, marshes, and streams where the going was good.

When hunting, they circled swamps and other places where deer might be found, splitting up into twos and threes with some going each way. We saw three places where deer had been chased for some distance and then the chase had been abandoned.

The wolves usually did not like to cross roads and trails, even when there were no fresh tracks. They would come near the trail in a number of places before crossing, and sometimes would turn back. However, in one place they came out on a snowshoe track only a couple of hours old, and followed it for a quarter of a mile. When frightened, they kept in the heavy bush and would not cross lakes, marshes or even open spots in the bush. This was true of a pack frightened in Jones Bay and followed for three or four miles.

About 9 a.m. on February 7th, we struck a wolf track a few hours old, west of Gull Lake Creek. The wolf was alone and seemed to be hunting. We followed him south-west, in the general direction of the North Branch. He chased two deer for a quarter-mile and then gave them up. He continued on to Penaish Lake on the North Branch, and joined up with the remainder of the pack. They followed down the north-west side of the North Branch and up on the high hill north of Onaway Lake. They played around here for some time and also lay down. Then they started on again, crossing at the head of Omemei Lake. They hunted through this country, across towards Fools Lake, but did not kill anything. An old kill was visited about lot 32, concession 1, McLaughlin Township. The wolves chased some deer but gave them up after following them some distance. They turned south and hunted via Banshee and Wabasso Lakes. We left them here and went to North Branch Cabin for the night. On February 8th, we continued on from Wabasso Lake and followed the wolves to near Edwin Lake. They were hunting through here and the tracks were hard to follow because they were snowed in, and it was drifting. We returned to the Cabin at Graham Creek and remained over night.

On February 9th, we tried to locate fresh tracks around Opeongo Lake. A pack of ten wolves was frightened about 3:00 p.m. but we did not see them. They had killed a deer in the end of Jones Bay and seemed to have been living there about a week. We followed them for two hours east of Jones Bay, heading in the general direction of Annie Bay, but had to give them up on account of darkness. They kept in the heaviest and dirtiest bush in this section and would not cross lakes, marshes or open places. We camped over night east of Jones Bay, and during the night a heavy snow and sleet storm wiped out all traces of tracks so we returned to Sproule Bay on the morning of February 10th.

Again on March 2nd, Heintzman started out to try to locate some fresh tracks for us to follow next day. In the section between Sproule Bay, Little Opeongo, the Highway, and Opeongo road, he located a pack of ten wolves, and followed them in this area all day. They had killed three deer north of Hermit Lake and had only eaten a few pounds of meat from the hips

* Timber Wolf (*Canis lupus*)

of each one. One of these deer was still alive, so Heintzman finished it off. Apparently he had frightened them away from the kill, and they remained in this section all day, although he tried to get them started out in some direction. He returned to Sproule Bay for the night. The next day we started out in the same vicinity, and we found that some of the wolves had returned during the night but had not touched any of the kills. We also found where some of the wolves had walked on Heintzman's snowshoe tracks of the day before. The snow had drifted in this open country and there were so many tracks that we could not tell which were the freshest. We finally located the fresh tracks about 1:30 p.m. south-east of Hermit Lake where we frightened the wolves. They went east and crossed the Opeongo road and kept north of Costello and McCauley Lakes. They kept to the bush and the brush all the time and did not cross any lakes. We left them at McCauley Lake and went to the Halfway for the night. On March 4th, we kept on after them and they went east. After dark they came out on McCauley Creek and travelled down by Segwun Lake and the park line. They had travelled this section after dark, and not stopped, and kept in the best going all the way. We followed them down stream as far as Booth's old headquarters and they were still heading down stream towards the Madawaska River. We left them here and returned to the Halfway.

*SOME NEW PELECYPODS FROM THE TRIASSIC OF THE PEACE RIVER FOOTHILLS**

By F. H. McLEARN

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A FEW common species from the Peace River Triassic are described in the following pages:

Pteria? collipiana n. sp., *Myophoria silentiana* and *Pleurophorus kissoumi* n. sp. are in the Karnian *Lima? poyana* fauna. *Pecten nihanianus* n. sp., *Pecten otianus* n. sp., *Modiolus ahsisi* var. *stelcki* n. var. and *Myophoricardium lineatum* Woehrmann are in the *Halobia* zone. *Pecten tranquillianus* n. sp., and *Myoconcha cauriniensis* n. sp. are in the *Nathorstites* zone and *Pecten nihanianus* var. *dresseri* n. var. occurs above the *Monotis subscircularis* zone.

Some of the pelecypods in the *Halobia* zone are present in the parts correlated with both the Kernian and Norian and have a longer range than any of the ammonoids.

All descriptions are brief and preliminary and some of the generic references are subject to revision.

Pteria? collipiana n. sp.
Plate 1, figure 3

The left valve is quite convex and oblique and has somewhat irregular, radial ribs. The posterior wing is large, gently convex and has a concave posterior margin. The anterior wing is very convex and is separated from the body of the valve by a broad, shallow furrow. The hinge is not well preserved.

There is at least some superficial resemblance to *Gervillia loewenighi* Boehm from Bear Island, but among other distinctions, the radial ribs are coarser.

Geol. Survey collections, holotype, cat. No. 8759.

Myophoria silentiana, n. sp.
Plate 1, figure 2

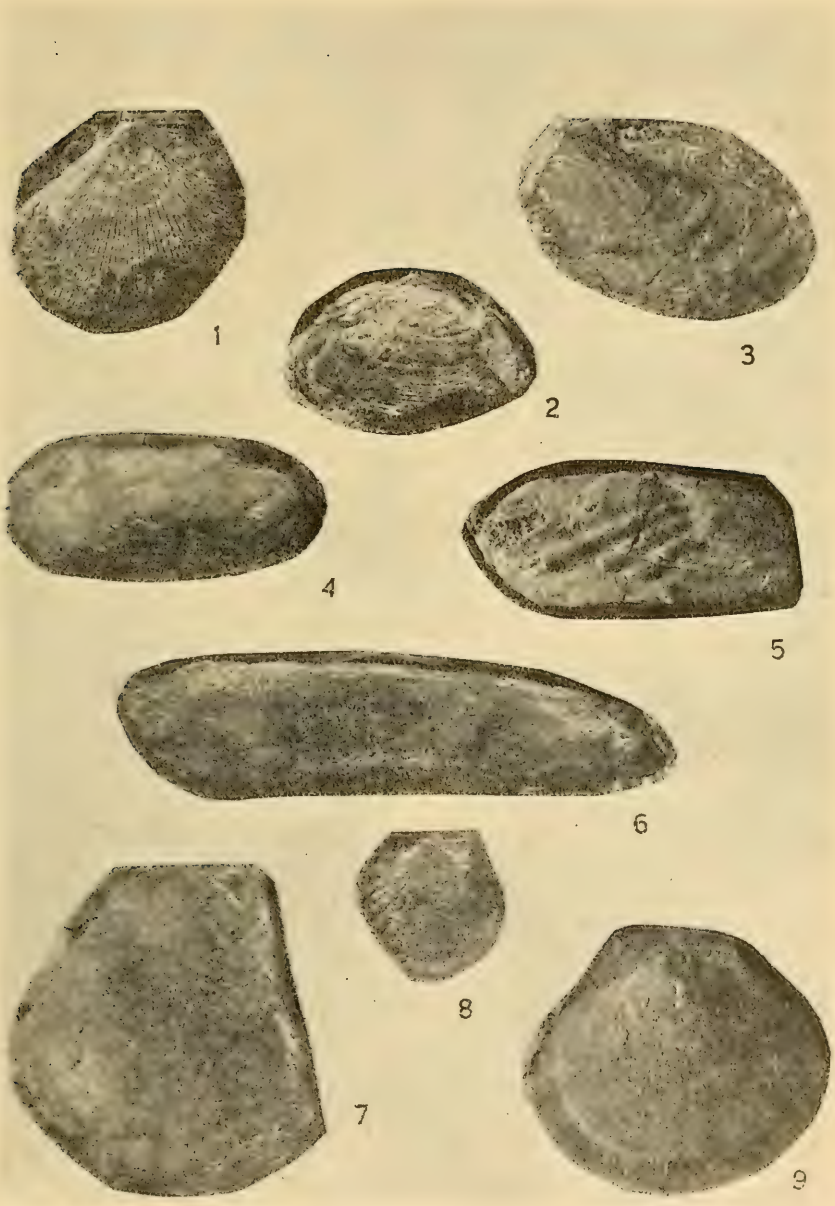
This is a somewhat compressed to fairly convex, sub-rhomboidal species with shallow sulcus, just anterior to the postumbonal slope. It is ornamented with fairly regular, concentric costae, which are curved or wavy where they cross the shallow sulcus. It is referred to *Myophoria* in the broad sense.

The Alpine species, *Myophoria solitaria* Bittner has a much finer and almost striate, concentric ornament, which is not wavy on the sulcus in front of the postumbonal slope.

Geol. Survey collections, holotype, cat. No. 8758.

Pecten nihanianus, n. sp.
Plate 1, figure 1

The right valve of this ornate species is somewhat less convex than the left. There are numerous, alternating, fine and very fine, radial, thread-like costae and concentric, rather evenly spaced, very fine costae or striae, forming a net-like or lacy ornament. There are 3 to 4 radial, fine costae on the anterior wings.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The concentric costae are closer, more numerous and more even, so that the ornament is more net-like, and the posterior wing is relatively a little smaller than in the Alpine species *Pecten salomani* Tommasi. The anterior ear is smaller than that of the Hungarian species *Pecten transdanubialis* Bittner, but there is some resemblance in ornament.

Geol. Survey collections, holotype, cat. No. 8782.

Pecten nihanianus var. *dresseri* n. var.
Plate 1, figure 9

The average outline is similar to that of *Pecten nihanianus* n. sp., but the radial, fine costae are somewhat wavy, not straight, and the concentric ornament is much finer and more closely arranged.

The anterior ear is shorter than that of the Hungarian species, *Pecten transdanubialis* Bittner.

Geol. Survey collections, holotype, cat. No. 8783.

Pecten otianus n. sp.
Plate 1, figure 8

This small, moderately compressed species is about as long as high and is ornamented with numerous, closely spaced, fine and very fine, paired or bundled costae.

It is smaller than the Alpine and Sicilian species, *Pecten egidii venantii* Tommasi, lacks the depression along the postero-dorsal margin and although the ornament is somewhat similar, it differs in detail.

Geol. Survey collections, holotype, cat. No. 8779.

Pecten tranquillianus, n. sp.
Plate 1, figure 7

This moderately convex, approximately equivalve species is a little higher than long. Low, radial folds are crossed by concentric, wavy, fine and evenly spaced varices of growth.

The ribs are fewer in number and of less relief than those of the Timor species, *Pecten rothpletzi* Krumbeck or the Hungarian species, *Pecten janirulaeformis* Bittner.

Geol. Survey collections, holotype, cat. No. 8778.

Myoconcha cauriniensis n. sp.
Plate 1, figure 6

This is an elongate, fairly convex, equivalve species, narrowed anteriorly and highest near the posterior end. The beaks are near the anterior end and the surface has irregular, fine varices of growth.

Geol. Survey collections, holotype, cat. No. 8761.

Modiolus ahsisi var. *stelcki* n. var.
Plate 1, figure 4

The outline and form are about as in *Modiolus ahsisi* McLearn, but the size is larger and there is a more pronounced sulcus in front of the postumbonal slope.

Geol. Survey collections, holotype, cat. No. 8760.

Pleurophorus kissoumi n. sp.
Plate 1, figure 5

This is an elongate, compressed species, with nearly anterior beak. Coarse, radial ribs start near the beak and increase in size posteriorly. They are, however, absent on the antero-ventral part of the surface. There is also a concentric, coarsely lamellose ornament.

The ribs are stouter than those of *Pleurophorus anderssoni* Boehm from Bear Island. The hinge is unknown.

Geol. Survey collections, holotype, cat. No. 8777.

Myophoricardium lineatum Woehrmann

Specimens of this species from the Peace River foothills show a remarkable resemblance to specimens from the Alpine Triassic, as figured by Bittner. This is a fairly widely distributed species and has been reported from the Alps, Island of Sicily, Jordan Valley and Yun-nan.

DESCRIPTION OF PLATE I

FIGURE 1. *Pecten nihanianus* n. sp. Holotype. Geol. Surv. colls., cat. no. 8782.

FIGURE 2. *Myophoria silentiana* n. sp. Holotype. Geol. Surv. colls., cat. no. 8758.

FIGURE 3. *Pteria? collipiana* n. sp. Holotype. Geol. Surv. colls., cat. no. 8759.

FIGURE 4. *Modiola ahsisi* var. *stelcki* n. var. Holotype. Geol. Surv. colls., cat. no. 8760.

FIGURE 5. *Pleurophorus kissoumi* n. sp. Holotype. Geol. Surv. colls., cat. no. 8777.

FIGURE 6. *Myoconcha cauriniensis* n. sp. Holotype. Geol. Surv. colls., cat. no. 8761.

FIGURE 7. *Pecten tranquillianus* n. sp. Holotype. Geol. Surv. colls., cat. no. 8778.

FIGURE 8. *Pecten otianus* n. sp. Holotype. Geol. Surv. colls., cat. no. 8779.

FIGURE 9. *Pecten nihanianus* var. *dresseri* n. var. Holotype. Geol. Surv. colls., cat. no. 8783.

NOTES AND OBSERVATIONS

LAND BIRDS OCCASIONALLY CONVEYED ACROSS THE ATLANTIC.—On the 1st July, 1939, I sailed on *S.S. Melmore Head* from Three Rivers, Quebec, for Dublin. We carried a considerable deck cargo of lumber. Just after passing the Straits of Belle Isle I noticed a Redpolled Linnet (*Acanthis linaria*)—either female or immature, as it lacked the red on its breast—hopping about among the lumber. Some sailors told me they had seen the bird come aboard at Three Rivers. We fed it on bread crumbs but three days out of Belle Isle the weather turned cold and next morning we found the bird dead.

On the 19th August I sailed from Liverpool on the *S.S. Letitia* for Montreal. Just off the Irish coast I noticed a Pied Wagtail (*Moticilla alba Yarrellii*), either female or immature, on the stern of the ship. I was informed it came aboard when the ship was anchored in Belfast Lough on the 18th August. The passengers fed it on bread crumbs and we saw it every day till we entered the Straits of Belle Isle. It then disappeared, probably flying to the coast of Labrador then only two or three miles distant. Up to the moment of its disappearance it seemed well and lively.

These instances show that land birds, probably immature specimens especially, must cross the Atlantic on ships much more frequently than we would expect, and places like the coast of Donegal and Belle Isle should be the localities where such specimens are likely to be found. Incidentally, does the above record make the Pied Wagtail a Canadian bird?—C. P. MARTIN.

On the subject of other waifs on shipboard at sea, see Merriman and Taverner's articles, *Canadian Field Naturalist* XLVII, pp. 139-140, 1933. Rapid transit facilities are likely eventually to carry many more of these wanderers to and from our shores. The determining factor of survival en route appears, short of violent storms, etc., to be the supply of fresh water available rather than food or weather conditions.—ORNITH. ED.

A NORTHERN OCCURRENCE OF THE ANGLER (*Lophius piscatorius* Linn.) ON THE COAST OF THE PROVINCE OF QUEBEC.—A recently-caught dead specimen of *Lophius piscatorius*, the Angler or Monkfish, was shown to me on August 12, 1939, at Great Mecatina Island, Saguenay County, Quebec. Great Mecatina Island lies in north latitude 50° 48′, west longitude 58° 52′, near the north shore of the Gulf of St. Lawrence. I was informed that this specimen of the Angler had been caught near that island, on August 11, 1939, on a "trawl" or set-line, set for codfish. Residents of Great Mecatina Island and vicinity said that they had never seen such a fish before, so it must be rather rare there. Presumably this place is near the periphery of its range. The specimen, which was about three feet long, was identified by me with the aid of the "Field Book of Marine Fishes of the Atlantic Coast," by Charles M. Breder Jr.—HARRISON F. LEWIS.

SONG SPARROW FEEDS FIVE COWBIRDS.—On 10th July, 1939, at Ma-me-o Beach, Pigeon Lake, about 28 miles west of Wetaskiwin, Alberta, while in company with William M. Barnett, we saw a Song Sparrow, (*Melospiza melodia*), industriously feeding *five* young Cowbirds, (*Molothrus ater*), on the beach. It would seem there had been wholesale adoption here and the foster-parent was certainly "working her (or his) head off" to keep up with the demands of the family.—W. A. D. LEES.

BIRD NOTES FROM QUEBEC.—Amongst the birds of unusual occurrence in the district, which my wife and I collected this spring, were the following:

EASTERN MOURNING DOVE (*Zenaidura macroura carolinesis*).—An adult male collected by the writer at Cap Rouge, Quebec, on April 17, 1939. There was still snow on the ground at many places, but the bird was on a steep bare bank of the St. Lawrence river. A remarkable fact is that I collected the same species within a hundred yards of the same spot on April 12, 1923, when the same conditions of snow on the ground and of bare bank of the river existed. I never saw a Dove in the district during the intervening years, though in the field practically every week, winter and summer.

WOOD DUCK (*Aix sponsa*).—An adult male collected by my wife and an adult female by myself at Isle aux Grues, Quebec, on May 7, 1939. With white suits on, we drifted amongst cakes of ice and came so near the birds that

we got them with dust shot. This is the first time since 1921 that we saw this species.

NORTHERN RAVEN (*Corvus corax principalis*). —A fledgling collected by the writer at Grosse Ile de Kamouraska, Quebec, on May 24, 1939. The bird seemed to be over three weeks old, which shows the species to be a very early breeder. The first egg was probably laid during the first week of April, when it was still winter down there, as the light-house keeper, with whom I stayed, crossed on the ice on April 13. The specimen was alone in the nest when collected.—GUSTAVE LANGELIER.

VIRGINIA DEER IN PRINCE EDWARD ISLAND. —According to the old adage "One swallow does not make a summer," and some might say "one bone does not make a whole deer," nevertheless, I believe that an astragalus found about 14 inches deep in an Indian shell-heap on Robinson Island, Rustico Bay, Prince Edward Island, may be taken as presumptive evidence of the presence of Virginia Deer, (*Odocoileus virginianus*), in the Island in prehistoric times. The astragalus presents the same appearance as bones of other mammals found in the shell-heap and it shows no signs of cutting or other artificial modification, and therefore there was no reason for carrying it from the New Brunswick or Nova Scotia mainland. None of the early visitors to the Island mention the presence of the deer, and even in Nova Scotia, as I mentioned in my article "Archaeology as an aid to Zoology" (*Canadian Field-Naturalist*, vol. XXXIII, 1919, p. 65), the first printed record of its appearance was in 1888, when it was introduced by whites; in New Brunswick it was not seen until 1818. —W. J. WINTEMBERG.

OCCURRENCE OF THE SHOVELLER ON ANTICOSTI ISLAND, QUEBEC.—On October 11, 1938, while hunting Black Ducks on the west end of Anticosti Island, Quebec, I shot a Shoveller (*Spatula clypeata*), which came in with a flight of Blacks. It was in perfect condition, although its crop was empty.

I understand that this duck has not been recorded previously from Anticosti. None of the residents of the island were familiar with it and the specimen recorded above is the only one I have seen on Anticosti.—H. E. GRAHAM, *Resident Manager of Anticosti Island.*

HUNGARIAN PARTRIDGE IN PRINCE EDWARD ISLAND.—In the October, 1931, issue of *The Canadian Field-Naturalist* (Vol. XLV, No. 7, p. 180) an item, for which I was responsible, appeared, in which details were given with respect to the introduction of the European Gray Partridge into Prince Edward Island and in which I stated that this occurred in April, 1930.

It has recently come to my attention that in making this statement I was in error, for I have been informed by Mr. J. D. Jenkins of Charlottetown, the man who imported them, that they were liberated on October 27, 1927.

At this date, twelve years later, it seems worthy to note that this species has become firmly established over the major portion of the Island and for the past two years a short open season has been permitted, with the result that fair bags have been secured by local sportsmen.—R. W. TUFTS.

TWIN EMBRYOS IN A BROWN THRASHER EGG.—On July 5th, 1939, Leonard Denny Watson found an egg of the Brown Thrasher (*Toxostoma rufum*) on the ground close to a nest of the same species, which contained two partly fledged young, about three feet up in a bush. The egg was broken at one end and dented. Watson broke away part of the shell and found that it contained two embryos. He brought the egg to the writer and the embryos were still encased in the lower portion of the shell. The embryos had reached the point of hatching, but had apparently been unable to break their way out of the egg. Both embryos were perfectly formed and one was only slightly smaller than the other. When found, the embryos were quite fresh and, although the shell was broken at one end, ants had not yet attacked. This suggests that the egg had very recently been ejected from the nest.

Although double-yolked eggs are of frequent occurrence in domestic fowl, this evidence of twin embryos in the eggs of a wild species of bird is unique in the writer's experience.—B. W. CARTWRIGHT.

RING-NECKED PHEASANT PARASITIZES RUFFED GROUSE NEST.—On May 8, 1939, Mr. W. H. B. Hoare, of Britannia Heights, Ontario, informed me that his daughter Sheila had found a grouse nest with three large bluish eggs in it, besides the usual quota of grouse eggs. While the

description was mystifying, there was evidently something out of the ordinary, and on May 13 I visited the nest. It was a Ruffed Grouse (*Bonasa umbellus*) nest, with eleven normal grouse eggs, one "runt" (dwarf) grouse egg, and three normal Ring-necked Pheasant (*Phasianus colchicus*) eggs, which were the "blue" eggs in question. The nest had been deserted since its discovery.

Unable at the time to remove all the eggs, I felt that a record should be made by collection and took two normal grouse eggs, the "runt" egg, and one pheasant egg. On May 16 the site was revisited for the purpose of completing the collection, but the nest was found destroyed, with only one piece of egg shell left. The eggs collected are in the Royal Ontario Museum of Zoology, Toronto. They were fresh and unincubated.

Two distinct and probably unrelated records are established, namely, of a "runt" egg in a Ruffed Grouse nest, and, far more important, an instance of nest parasitism of the Ruffed Grouse by the Ring-necked Pheasant. Bennett[1] has described similar parasitism of Mallard, Shoveller, Blue-winged Teal, King Rail, Virginia Rail and European Partridge. This particular Ruffed Grouse nest was unusual among many seen by me in the small amount of tree cover around it, while at the same time the ground cover was unusually thick.—C. H. D. CLARKE.

[1]Bennett, Logan J., 1936—The Ring-necked Pheasant as a nesting parasite of other game birds. *Iowa State Journal of Science, Vol. 10, pp. 373-375.*

A LARGE FLOCK OF EIDERS NEAR MONTMAGNY, QUEBEC.—On November 12, 1938, I saw about 175 Eiders in one flock on the St. Lawrence River (South Channel) near the mouth of Rivière du Sud, within a mile of the town of Montmagny. As we approached them in a motorboat, they all arose at once and flew away to the westward. Most of them were in brown plumage, indicating that they were females or young males, but there were some 15 or 20 adult drakes scattered through the flock. Presumably the Eiders in this flock were Southern Eiders (*Somateria mollissima dresseri*).

Probably Southern Eiders seldom range in numbers much farther up the St. Lawrence River than the vicinity of Montmagny. The local boatman, with whom I was travelling when this flock was seen, did not recognize them when his attention was called to them.

The upper limit of salt water in the St. Lawrence estuary, although, of course, it changes continually, must be not very far from Montmagny and the mouth of Rivière du Sud.—HARRISON F. LEWIS.

NEWFOUNDLAND CARIBOU LIBERATED IN NOVA SCOTIA.—On April 10, 1939, nine female Caribou (*Rangifer terraenovae*) five of which were with calf, arrived in Halifax from Newfoundland. These animals were imported for liberation in the Liscombe Game Sanctuary which is in Guysboro County. The five with calf were immediately taken there and the others are being held in Halifax pending the arrival of three males which will complete the order.

Only a few generations ago the Eastern Woodland Caribou (*Rangifer caribou*) were native to the Province and were found here in goodly numbers but, presumably because of excessive shooting, they were either exterminated or driven out. This attempt to establish the Newfoundland species in former Caribou range is being made by the Province and the ultimate success of the venture is the hope of all who have an interest in our wild life resources.

—R. W. TUFTS.

THE BURROW OF AN ARCTIC SPIDER, *Lycosa asivak* Emerton.—During the past summer (1939) the writer, as a member of the Eastern Arctic Patrol, enjoyed the privilege of stopping over at Lake Harbour in southern Baffin Island for three weeks. In this vicinity, several burrows of a large wolf spider were noticed in the tundra on August 9. Specimens of the burrower have been identified by my colleague, Mr. T. B. Kurata, with *Lycosa asivak* Emerton, a species which was originally discovered by Frits Johansen in the western Arctic (Rept. Can. Arctic Exped. 1913-1918, Vol. III, Part H, 1919).

Altogether, I excavated and examined six or seven burrows which, in spite of disagreement in detail, presented certain features in common: diameter of burrow, 5/8 to 3/4 of an inch; shape in cross-section, circular or somewhat elliptical; some sort of silken covering to the entrance; a vertical shaft 1½ to 3 inches long, lined with silk; a horizontal underground shaft 1½ to 2½ inches long, with no visible silk lining; at the blind end of this shaft a female with her egg sac was to be found. Variations were noticed as follows: the covering to the entrance in its simplest form was a loose cobweb, in other

instances there was an enclosed "porch" of silk, in length 1½ to 2½ inches, situated on the surface and moored to the low vegetation. From this porch, the vertical shaft ran either from the centre or from one end. In one case, a hole was noticed in the side of the porch. Excavation confirmed the suspicion that the owner had departed. The vertical shaft was disposed perpendicularly or sloped as much as 45° to the horizontal. The horizontal underground shaft in one instance had a small step in its floor at the junction with the vertical shaft. In another example there was a small vertical pocket at the blind end of the horizontal shaft and in this depression the female was found.

It seems probable that the above-mentioned differences in construction may depend partially upon the nature of the soil. In any case, these burrows in the tundra seem to be more erratic in shape than those made in the more easily worked sand by *Lycosa missouriensis* Banks, reported recently in these pages by Kurata. (*Can. Field-Nat.* 53: 84-85, 1939).—J. G. OUGHTON.

Liskeardia NEW GENERIC NAME FOR *Hendersonia* WILSON NON WAGNER.—It has been found that the name *Hendersonia* is pre-occupied as a genus of living gastropods. The new name *Liskeardia* is hereby substituted for the Richmond cephalopod formerly called *Hendersonia* (*Can. Field Nat.* 52, p. 2, p. 1, 1938).—ALICE E. WILSON.

REVIEWS

SOUTH AFRICAN EDEN: *from Sabi Game Reserve to Kruger National Park—by J. Stevenson-Hamilton; Cassell and Company Limited, London, 2nd, ed. 1938, pp. 311, 26 illustrations. (Obtainable in Canada from booksellers or Cassell and Company Limited, 215 Victoria Street, Toronto).*

"South African Eden" is a history of the world's largest national park, the Kruger Park in South Africa, (8000 square miles), giving particular attention to how it all happened. The Kruger Park is an animal park. Lt.-Col. Stevenson-Hamilton, who, as Warden of the park, has known it for more than thirty-five years, thinks that it is beautiful, but there is a hint of the "dear, dirty old London" sort of attitude in his praise of this somewhat hot and dusty Eden. Receptive souls are enchanted by an elusive and deeply satisfying quality, the "spirit of the low-veld", a product of the harmony of stern mother Nature and her chosen creatures, but there would be no Kruger Park without the animals.

Thousands of tourists visit the park every year, during the dry season. At night they sleep in comfortable rest camps. By day they roam the roads in their automobiles, which they are forbidden to leave. Lion, elephant, giraffe and the rest are indifferent to automobiles, so that bank holiday crowds have viewed scenes of animal life that were denied to the most famous big-game hunters of old. Wonderful photographs are taken. In fact, through the wide circulation of films, many people in Canada who know very little about the Union of South Africa in general, know about the Kruger Park.

Times change. To-day the national park idea is well rooted in South Africa. In contrast, the author quotes a letter which appeared in the press not so very long before the park was established. "I would like (wrote this correspondent) to draw your readers' attention to the scandal of the Sabi Game Reserve, where they have been breeding lions for the last twenty-five years", So remarkable is the change and so fortuitous were the circumstances that brought it about that the author dedicates his book "To Cinderella who became a princess". We are fortunate to have such a record as this of the days of her obscurity.

There were many persons who watched the disappearance of wild life from South Africa with regret. One of them happened to be President Kruger, of the old South African Republic, whose interest was strong enough to lead to the establishment of the Sabi Game Reserve, in 1898. Before it was fairly started war swept over it. In the aftermath of the war, when administrative loose ends were being gathered up, it was put in charge of the author, who had a promising military career before him and never thought of staying more than a few years. Early in the game, however, he caught a vision of the Sabi Reserve as a national institution, and always came back. Little by little over the years he was able to communicate his vision to

others. Game reserves are creations of the administrative pen, and can be abolished as easily as they are created. A national park is a permanent institution, established by legislative action and abolished only in the same way. "South African Eden" gives a history of the progress of the Sabi Game Reserve to national recognition. Nothing succeeds like success, and the success of many worthy wild life conservation projects is made easier by the Kruger Park. No one interested in preserving wild life can afford to be ignorant of this history.

Besides administrative history, "South African Eden" has plenty of natural history in its pages, including a great deal of biological common sense that will apply anywhere. The experience of the Kruger Park with predatory animals gives us the benefit of some actual observations in a field where they are much needed. The Kruger Park lions are its biggest attraction. When administration of the Sabi area commenced in 1902, months of guerilla warfare had brought game to a low ebb, but the lions had not been disturbed and were disproportionately abundant. They were hunted vigorously by the staff until the Park was established, with the result that they were wary and seldom encountered unless hunted with dogs, resembling in this respect our own mountain lion. Lion hunting was stopped because it became evident that it was not needed, and those responsible were determined to make the park a complete sanctuary if at all possible. Ten years' experience of sanctuary has fully supported the claim that predators, lions and other species, fit naturally into the web of life, and are incapable of exterminating their prey. Most interesting of all is the history of the remote northern part of the park There, because the reserve was understaffed, no significant amount of predator control was carried out There, too, in early days, game was scarce and lions were abundant. After thirty years of letting Nature do her own job in her own way, both game and lions are abundant.

"South African Eden" is worthy of a large circulation, and is especially recommended for libraries great and small, where it may inspire as many people as possible with the purpose and principles of wild life sanctuaries.—C.H.D.C.

THE GEESE FLY HIGH.—*By Florence Page Jaques: University of Minnesota Press, Minneapolis, 1939; pp. 103, with numerous illustrations in black and white by Francis Lee Jaques. $3.00.*

"The Geese Fly High" is a fireside trip to the Arkansas and Louisiana waterfowl wintering-grounds. The clamour of ducks and geese fills every page. It is true that there are many paragraphs about other things than waterfowl, but they are about things associated with waterfowl—the marshes and swamps themselves, and the animals, warm-blooded and cold-blooded, in them, and the flotsam caught in the eddies of the stream of civilization. The book is vivid, amusing, and as warm as Southern hospitality. We are sure that when the temperature goes below zero we will find ourselves reaching for it.

The author's purposes are entirely literary and not scientific, but we are given a feast of interesting facts of natural history. In such matters she was guided by her husband, who did the drawings that illustrate almost every page. They give convincing proof of his knowledge and powers of observation. Mr. Jaques' birds leap out from the letterpress with a vivacity that is a complete fulfilment of the vivid impressions of the text. Writer and artist have combined to produce a book that anyone will be proud to own.—C.H.D.C.

EDIBLE WILD PLANTS. *By Oliver Perry Medsger. 8vo., pp. 323, 8¼" x 5", with 80 pen and ink drawings and 19 photographs. The MacMillan Co., New York, 1939. Price $3.50, cloth.*

The author, Professor of Nature Education, Pennsylvania State College (emeritus) in this little book has filled a long-felt want for a popular and still scientifically correct guide to the edible plants of United States and Canada. The plants are treated under the following headings: Fruits, Nuts, Seeds and seed pods, Salad plants and pot herbs, Roots and tubers, Beverage and flavoring plants, Sugars and gums and Mushrooms.

In addition to the general index, the author has prepared what he terms a "Finding Index" in which the plants, again under the above headings, are listed under the following geographical regions: 1. Northeastern United States and Eastern Canada, west to the Mississippi, 2. Southern United States. 3. The Mississippi to the Rocky Mountains. 4. Rocky Mountains and Pacific States. In the "Finding Index," in addition to scientific and common names, are given the chief characteristics of each plant, its general range, when in season and page reference.

The descriptions of the plants discussed are non-technical, and, generally speaking, excellent. In addition, there are numerous personal observa-

tions and quotations from works of travel. At the end of each chapter are given brief notes on additional species not tested by the author, many of them, perhaps, of little or questionable value as edible plants.

The nomenclature used, with some few exceptions, is that of the International Code. The geographical range given is broad but fairly accurate, except in the case of some few northern plants as when the author under Cowberry (*Vaccinium Vitis-Idaea*) states that the "polar bear on the Arctic coasts spend much time eating the fruits of this little evergreen plant." The author occasionally is carried away by his enthusiasm, and some few statements no doubt need qualification as when on page 133 he suggests that Iceland moss (*Cetraria islandica*), when powdered, can be made "into cakes or bread" and that it "contains more starch than potatoes and more flesh-building food than oatmeal."

The illustrations, with few exceptions, are excellent. A bibliographical reference to the more important works dealing with edible plants would have been useful.

The book should be very useful and no doubt, will be welcomed by backwoods travellers, housewives not afraid to try something new, and by all nature lovers.—A. E. P.

FISHES OF THE OTTAWA REGION. *By J. R. Dymond. (Contributions of the Royal Ontario Museum of Zoology, No. 15, 43 pp. 1939).*

Although the Ottawa District has an unusually interesting fish fauna, works describing it are scarce. Professor Dymond, Director of the Royal Ontario Museum of Zoölogy, Toronto, fills a real need in publishing this work. In non-technical language, with Latin names reduced to the minimum, he first sketches in the geological background and the drainage connections which are responsible for the assemblage of fishes in the area, then he deals briefly but interestingly with the history of the fisheries in the district and the published accounts. The Annotated List occupies the greater part of the work and some sixty-five species are dealt with, including a few doubtful and improbable old records.

The bibliography is excellent and contains many odd items from the past. There are four items credited to "H. B. Small" and in this connection it is interesting to note that there were two men of this name, father and son, both prominent naturalists. Henry Beaumont Small, Senior, was born in Market Bosworth, England, in 1831, went to New York in 1858 and came to Canada in 1865, later becoming Chief Clerk of Immigration and Quarantine for Canada. His son, Henry Beaumont Small, Junior, was born in Toronto in 1856, graduated from McGill University and practised medicine in Ottawa for many years. At the present time he is one of the oldest, if not the oldest physician in Ottawa and the only surviving founding member of the Ottawa Field-Naturalists' Club, his name appearing immediately below that of his father in the first list of members in the Transactions of the Club. The first two "H. B. Small" items in Professor Dymond's bibliography are probably by Small, Senior and the last two by Small, Junior.

The work of the Ottawa Field-Naturalists' Club is well represented by the contributions of its members, seven being credited to the late Andrew Halkett alone.

An early Ottawa naturalist, Dr. Edward Van Cortlandt, is mentioned briefly, being the author of one of the first papers on the fishes of Ottawa. The reviewer has collected a good deal of information concerning Dr. Van Cortlandt which he intends to include in an account of the beginning of Natural History in the Ottawa region to appear later in *The Canadian Field-Naturalist.* Suffice it to say here that Dr. Van Cortlandt was a pioneer physician in Ottawa, an amateur geologist, zoölogist and palaeontologist; he was described as "odd and eccentric in manner and dress" but of this, more anon.

Professor Dymond has produced a compact and accurate account of the Fishes of the Ottawa District and has earned the gratitude of all naturalists and anglers around the Capital. —A. L.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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THE PLANTS OF ISLANDS 74 AND 85 IN THE FRENCH RIVER, ONTARIO

By LYSTER H. DEWEY

Foreword

We are fortunate in being able to publish the following account, forwarded to us by the Dominion Botanist, of the flora of two islands in the French River, Ontario, by Mr. Lyster H. Dewey, who was at one time associated with Dr. George Vasey in his work on grasses and who later was for 36 years botanist in charge of fibre investigations in the United States Department of Agriculture.

Mr. Dewey spent six weeks on these islands during the past summer and collected a fine set of specimens. Contributions such as these on the local flora of small districts can do much toward making valuable additions to our knowledge of the Canadian flora.

A VACATION of seven weeks, June 29 to August 16, 1939, was spent on Island 74, of about 2 acres, not previously inhabited. Plants were also collected in adjacent parts of Island 85, estimated at more than 200 acres, never inhabited. Observations were made from a motor boat of the rocky shores of many islands.

Only a small part of the time was devoted to collecting and pressing plants and only those were collected which were in flower or fruit or which could be readily identified. No attempt was made to collect lichens or mosses. Lichens were very abundant and represented by many different forms.

French River is the outlet from Lake Nipissing into Georgian Bay, in western Ontario. It is about 50 miles in a direct line from the source of the river on the south shore of Lake Nipissing to the shore of Georgian Bay where the river empties through a half dozen outlets. About 20 miles from its source, the Little Chaudiere and Great Chaudiere are the beginning of falls and rapids. Below these the river is broken up into comparatively narrow and widely separated channels. Above the falls, the river is from one-fourth mile to two miles wide flowing southwest. It has but little current and is more like a lake than a river. The water level in this upper part of the river is controlled by a dam and sluice gates at the falls. There is a difference of about 5 feet between extremes of high and low water as is clearly shown on the vertical rocky shorees of the islands. There are numerous islands, mostly on the northwest side, and three or four deep bays on the southeast side of the main channel.

Islands 74 and 85 are about 14 miles from the source of the river in Lake Nipissing and about 6 miles above the falls. They are in a group of more than 100 similar wooded, rocky islands from 3 square rods to 200 acres in size, and separated by channels ranging in width from one to sixty rods. The islands are all gray granite rock, generally in ridges extending northwest and southeast, with a dip toward the northeast. The southeast sides of the ridges are broken and precipitous and the northeast sides are usually smooth and gently sloping. Between the rocky ridges there are shallow swales from one to 5 rods in width. In these swales the rocks are covered with decaying vegetation rarely more than a foot or two in depth, but usually supporting a dense growth of bushes. The flat or sloping surfaces of the rocks are sometimes quite bare, but more often covered with lichens and mosses. In many places there is a covering two to three inches thick of lichens, mostly Cladonias, and through this thin covering there is a network of rootstocks and roots of Lowbush Blueberry, Black Blueberry, Law Juniper and other perennial plants. The roots unable to penetrate the rock, except at occasional crevices spread out through the thin covering on the surface.

Frequently there are depressions without drainage high up on the rocks. These depressions contain rain water, usually with Sphagnum and Small Cranberry plants around the margins or in

many instances they are completely filled with Sphagnum.

No clay and very little sand was found on Island 74 and the small part of Island 85 where this collection of plants was made. The soil is practically all organic. Sometimes traces of "grit" were found on the roots of plants pulled out of fissues in the rock. The pines and other trees had roots extending into clefts in the rocks.

There is a heavy snowfall in winter and usually plentiful showers in summer, so the moisture conditions are favourable for plant growth, but the warm summer sun quickly dries out the thin covering of lichens on the rocks. The humidity is generally low. The air in summer is dry except when it is raining.

The water in the river is remarkably clear and soft. Since it has no clay banks and receives no clay-bearing tributaries it is at all times free from sediment. Although there is a difference of about 5 feet between low and high water, controlled by the gates above the rapids, there are no overflowed lowlands, aside from small portions of bushy swales extending down to the water. Most of the island shores are nearly vertical rocks or bare sloping rocks. Even if high water did carry seeds or other propagating material, there is little opportunity for water borne introductions to become established.

Only about 25 of the islands are inhabited and these for only a few weeks in midsummer. There is no cultivation of plants on the islands and only a little by the Indians, two miles or more away on the mainland, so there are practically no introduced plants. The common weeds of cultivated lands are entirely absent. Even the native plants do not readily migrate from one island to another. Such widely distributed species as the Common Bracken, Sweet Fern, Prickly Rose and Bigleaf Aster are abundant and wide spread on Island 85, but absent on Island 74 separated by a channel only 125 feet wide.

The period between killing frosts is usually less than three months but during the frost free period the days are generally warm with temperatures ranging from 70° to 85°F. and the nights below 70°F.

With these limitations, short growing season, lack of soil, little diversity in growing conditions, and absence of introduced plants, the number of species is limited.

The plants collected are nearly all species that are widely distributed, but here, literally "on the rocks", many of them are in an unusual environment.

White Pine, *Pinus Strobus*, is the largest and most abundant tree on islands near the main channel. On some islands farther back it is largely replaced by Jack pine, *Pinus Banksiana*. Old white pine cones were abundant on the ground but very few new cones were on the trees and these green cones were being eaten by red squirrels. Some White Pines were subject to a physiological condition sausing the leaves to turn brown. The White Pine Blister Rust has not reached this region.

Red Pine, *Pinus resinosa*, attains a height of 25 in. with trunks 30 to 40 cm. in diameter, but not found in abundance anywhere on the islands. No Red Pine cones were seen.

Black Spruce, *Picea mariana*, propagating by tips of the low branches spreading out and taking root in the moist leaf mould is locally abundant.

White Cedar, *Thuja occidentalis*, is found only as a small tree confined chiefly to the rocky shores, propagating mostly by shoots from the roots.

White Birch, *Betula papyrifera* Marsh. is the largest deciduous-leaved tree on the islands, attaining a height of 15 m. with trunks 20 cm. in diameter.

Red Oak, *Quercus rubra* and Silver Maple, *Acer saccharinum*, are observed on the rocky islands only as clusters of shoots 1 to 5 m. high, with some of the taller shoots dead, indicating a killing back nearly every winter.

There were no turf-forming grasses and no conditions permitting their development.

Lowbush Blueberry, *Vaccinium angustifolium* was abundant on Island 74, from 15 to 25 cm. high in thin lichen covering on rocks and 30 to 60 cm. high in swales or sphagnum, furnishing a plentiful supply of delicious berries from the last of June to the middle of August. Black Blueberry was easily distinguished by its lighter apple green leaves, less marked later in the season, and their colour not preserved in the dried specimens. Its black or dark purple berries often with and without bloom on the same bush, were larger, later, sweeter, but with less flavour than those of the Lowbush Blueberry.

LIST OF SPECIMENS COLLECTED

Those marked Island 85 were not found on Island 74.

Woodsia ilvensis (L.) R. Br. Rusty Woodsia. Island 85.

Dryopteris spinulosa (Retz.) Kuntze, Toothed Woodfern. Island 74, 85.

Dryopteris marginalis (L.) A. Gray, Evergreen Woodfern. Island 85.

Polypodium vulgare L. Common Polypody. Island 74, 85.

Pteridium aquilinum L. Kuhn. Bracken. Island 85.

Pinus Strobus L. White Pine. Island 74, 85.

Pinus resinosa Ait. Red Pine. Island 74, 85.

Pinus Banksianna Lamb. Jack Pine. Island 74, 85.

Larix laricina (Du Roi) Koch. American larch. Island 85.

Picea mariana (Mill.) B.S.P. Black Spruce. Island 74, 85.

Abies balsamea (L.) Mill. Balsam. Island 85.

Thuja occidentalis L. White Cedar. Island 74, 85.

Juniperus nana Willd. Low Juniper. Island 74, 85.

Sparganium angustifolium Michx.-Narrow-leaved Burweed. Island 85.

Potamogeton americanum Cham. & Schl. Pondweed. Island 85.

Sagittaria graminea Michx-Grass-leaved Sagittaria. Island 85.

Vallisneria spiralis L. Wild Celery. Island 85.

Panicum xanthophysum A. Gray-Slender Panicum. Island 85.

Panicum tennesseense Ashe. Island 74, 85.

Phalaris arundinacea L. Reed Canary Grass. Island 74, 85.

Agrostis hyemalis (*Walt.*) B.S.P. Rough Hair Grass. Island 85.

Calamagrostis canadensis (Michx.) Beauv. Bluejoint Grass. Island 74, 85.

Deschampsia flexuosa (L.) Trin. Wavy Hair Grass. Island 74, 85.

Danthonia spicata (L.) Beauv. Wild Oatgrass. Island 74, 85.

Glyceria borealis (Nash) Batchelder. Northern Manna Grass. Island 74, 85.

Agropyron pauciflorum (Schwein) Hitch. Slender Wheatgrass. Island 85.

Scirpus Torreyi Olney. Torrey's Bulrush. Island 85.

Scirpus cyperinus (L.) Kunth. Wool Grass. Island 85.

Carex utriculata Boot. Bottle Sedge. Island 74, 85.

Carex vesicaria L. Island 74, 85.

Carex scoparius Schk. Pointed Broomsedge. Island 74, 85.

Unifolium canadense (Desf.) Greene. False Lily-of-the-Valley. Island 74, 85.

Cypripedium acaule Ait. Pink Lady Slipper. Island 74, 85.

Spiranthes cernua L. Nodding Ladies' Tresses. Island 74, 85.

Epipactis pubescens (Willd.) A. A. Eaton. Downy Rattlesnake Plantain. Island 85.

Myrica Gale L. Sweet Gale. Island 74, 85.

Comptonia peregrina (L.) Coulter. Wweet Fern. Island 85.

Populus tremuloides Michx. Aspen. Island 74, 85.

Salix nigra Marsh. Black Willow. Island 74, 85.

Betula papyrifera. Marsh White Birch. Island 74, 85.

Quercus rubra L. Red Oak. Island 74, 85.

Aquilegia canadensis L. Wild Columbine. Island 85.

Corydalis sempervirens Pers. Pink Corydalis. Island 74, 85.

Ribes triste Pall. American Currant. Island 74, 85.

Spiraea tomentosa L. Hardhack. Mainland.

Fragaria americana (Porter) Britton Wood Strawberry. Island 85.

Comarum palustre L. Marsh Cinquefoil. Island 85.

Rosa acicularis Lindl. Prickly Rose. Island 85.

Aronia nigra (Willd.) Greene Black Chokeberry. Island 74, 85.

Lathyrus palustris L. Marsh Vetchling. Island 85.

Rhus hirta (L.) Sudw. Staghorn Sumac. Island 85.

Toxicodendron radicans (L.) Kuntze. Island 74, 85.

Ilex verticillata (L.) A. Gray Winterberry. Island 74, 85.

Acer rubrum L. Red Maple. Island 85.

Acer saccharinum L. Silver Maple. Island 74, 85

Epilobium angustifolium L. Fireweed. Mainland.

Kneiffia pumila (L.) Spach Small Sundrops. Island 74, 85.

Aralia nudicaulis L. Wild Sarsaparilla. Island 74, 85.

Aralia hispida Vent. Prickly Sarsaparilla. Island 74, 85.

Sium cicutaefolium Schrank. Water Parsnip. Island 85.

Cornus canadensis L. Bunchberry. Island 85.

Cornus Amonum Mill. Silky Cornel. Island 74, 85.

Monotropa uniflora L. Indian Pipe. Island 85.

Gaultheria procumbens L. Creeping Wintergreen. Island 74, 85.

Vaccinium nigrum (Wood) Britton Low Black Blueberry. Island 74, 85.

Vaccinium angustifolium Ait. Lowbush Blueberry. Island 74, 85.

Oxycoccus Oxycoccus (L.) MacM. Small Cranberry. Island 74, 85.

Trientalis americana Pursh. Star flower. Island 85.

Fraxinus pennsylvanica Marsh. Red Ash. Island 74, 85.

Frauxinus americana L. White Ash. Island 74, 85.

Scutellaria galericulata L. Skullcap. Island 85.

Lycopus virginica L. Bugleweed. Island 74, 85.

Lobelia cardinalis L. Cardinal Flower. Mainland.

Solidago juncea Ait. Early Goldenrod. Island 85.

Solidago nemoralis Ait. Gray Goldenrod. Island 85.

Euthamia graminifolia (L.) Nutt. Bushy Goldenrod. Island 74, 85.

Aster macrophyllus L. Bigleaf Aster. Island 85.

Aster Tradescanti L. Michaelmas Daisy. Island 74, 85.

FOUR ADDITIONAL BREEDING BIRDS OF ONTARIO

By JAMES L. BAILLIE, JR.

SINCE the publication of the *Distribution of Breeding Birds in Ontario* (Baillie and Harrington, 1936-7) it has been established that four additional species breed in the province. These four, all of them western species, bring the total of breeding birds in Ontario to 214 species.

Snyder (1938) has published the fact that the Western Meadowlark, *Sturnella neglecta*, breeds not uncommonly in Rainy River District, in extreme western Ontario. A female (now in R.O.M.Z.) containing an egg almost ready for extrusion, was collected at Emo on June 15, 1929 and on June 26, 1929 a nest with four young was found in the same area, both by Mr. Snyder.

It has long been suspected that the White-winged Scoter, *Melanitta deglandi*, might nest in north-western Ontario[1] but it was not until August 8, 1936, that a definite breeding record was forthcoming. On that date, Dr. Jack Satterly, geologist, saw an adult bird with downy young, on Ney Lake near the Manitoba-Ontario boundary between latitude 54° and 55°N. The species was quite common on the lake and Dr. Satterly obtained photographs of the downy young (which he presented to R.O.M.Z.).

Bonaparte's Gull, *Larus philadelphia*, constitutes the third addition. In this case also, geologists, who often penetrate areas seldom visited by the ornithologist, were again responsible. Drs. J. W. Britton and V. K. Prest, working Ivan Lake, near Lake Mimiska, on the Albany River about 100 miles north of Lake Nipigon, in northern Ontario, on July 21, 1937, came on three flightless young of this species together with their agitated parents. Dr. Britton described the birds accurately to the writer and there is no doubt in our minds of the species involved. The shore of the little lake was forested with spruce and it was in typical muskeg country. Dear (1939) has published a supporting record of two sets of three heavily-incubated eggs obtained by Mr. Clare Watson on June 16, 1938, at Rat Rapids at Lake St. Joseph on the Albany River (one of the sets presented to R.O.M.Z. by Colonel Dear), only 75 miles west of Ivan Lake. Watson had noted the presence of the species at Rat Rapids during the summer of 1937 but failed to establish a breeding record. The nests discovered in 1938 were placed about twenty-five feet up in black spruces beside a shallow muskeg lake.

The fourth and most recent addition is the White Pelican, *Pelecanus erythrorhynchos*, a small colony of which nested in 1938 on Dream Island, a few miles east of Massacre Island, in

[1] Sectional terminology of Snyder (1939).

the Ontario part of Lake of the Woods (Roberts, 1938). Prof. Gustav Swanson, visiting the lake on July 14, learned of the existence of the colony and was taken to it by the fisherman, Philip Smith, who had found it in June, when sixteen pelican eggs were counted. On the day of Prof. Swanson's visit four adults left the small rocky island on the approach of their boat and a census revealed only eight eggs. There was considerable evidence of disturbance by fishermen, who annually destroy great numbers of Double-crested Cormorants' (and evidently some White Pelicans') eggs, prompted by their belief that these birds are destructive to commercial fishing. For the particulars concerning this nesting I am indebted to Dr. Harrison F. Lewis, who had obtained the details from Prof. Swanson.

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NOTES AND OBSERVATIONS

DECIPHERING NUMBERS ON MUCH-WORN BIRD BANDS.—By means of bird banding the National Parks Bureau of the Department of Mines and Resources, Ottawa, has for over sixteen years, in co-operation with the United States Bureau of Biological Survey, Department of the Interior, Washington, D.C., been accumulating new, interesting, and useful statistics relative to the economic status and general life history of native wild birds which comprise an important natural resource of great value.

Occasionally a band which has been recovered and submitted to the National Parks Bureau has been found to have been carried by the bird for so long that the band number has been partially, or even completely, obliterated through wear. Because it is impossible without knowing the band number to trace the records for the birds which carry such bands, and because these old bands always provide age and migration data of more than usual interest and importance, the problem of deciphering the numbers was undertaken. The Ore Dressing and Metallurgical Laboratories of the Mines Bureau have been successful in identifying a number of worn bands; the chemical procedure followed being that defined by The American Society for Metals for the macro-etching of aluminium.

	Hydrofluoric acid	*Hydrochloric acid*	*Nitric acid*	*Water*
Solution 1.	10 ml.	15 ml.		90 ml.
Solution 2.	15 ml.	45 ml.	15 ml.	25 ml.

The bands were cleaned in absolute alcohol, dried, and then immersed in the etching solution for 10 seconds. A wash in running water, a dip into alcohol, and drying of the sample completed the operation. Best results were obtained with about three etches in Solution 2. Any further etching served only to obliterate the markings brought out by the previous treatment.

Copper bird bands were treated as follows:—

Ferric Chloride	*Hydrochloric Acid*	*Water*
5 grammes	50 cc.	100 cc.

The band was etched by immersion in the solution for approximately five minutes. After etching the specimen was washed in water, dipped in alcohol, and finally dried in a current of warm air.

Persons in Canada who recover banded birds are urged to help gather precise data on the life histories of native wild birds by reporting the complete facts to the Controller, National Parks Bureau, Department of Mines and Resources, Ottawa. A reply giving complete banding details for any banded bird reported will be furnished. Even apparent obliteration of the band number does not necessarily prevent the tracing of a band.

HOYES LLOYD.

REVIEWS

THE BUTTERFLIES OF THE NIAGARA FRONTIER REGION *by William Wild. Bulletin of the Buffalo Society of Natural Sciences*, 1939.

Of late years the field of entomology in Eastern Canada has been increasingly usurped by agricultural scientists, the study of insects becoming

rapidly relegated to merely a phase of plant protection. Any tendency to restore the balance is welcomed, and Mr. Wild's booklet, even though it does not come from Canada, is especially welcome both as treating an entomological subject as a study of interest and beauty, and also because it encourages the naturalist to know his own region. of interest and beauty, and also because it encourages the naturalist to know his own region.

In this bulletin the author enthusiastically sets forth the pleasureable hobby of collecting butterflies. Directions as to how to go about it are given with adequate illustrations, together with a little pure entomology, and suggestions for study of life-histories. The most common species are fully discussed, with very clear illustrations, making identification quite easy and really a pleasure. A check list for the Buffalo region is given, numbering 73 species, as against the figure 650 in McDunnough's list for the U.S. and Canada.—A.W.A.B. — W.C.McG.

"FIELDBOOK OF ILLINOIS LAND SNAILS"—*by Frank Collins Baker. State of Illinois, Dept. of Registration and Education, Natural History Survey Division, Manual 2—Urbana, August,* 1939. 166*pp., col. plate, photographs, many text figs. Price* $1.00.

Good field books on Mollusca usually fall into two classes: those written by professional malacologists with little ability to write and those written by professional writers with little knowledge of Mollusca. When a field book appears which does not fall into either class it deserves more than passing notice; such is the Fieldbook of Illinois Land Snails, just published by the Illinois Natural History Survey as the second of its Manuals. It is the work of Professor Frank Collins Baker whose reputation is well-established both as a sound malacologist and an able popular writer on Natural History.

Within the covers of a thin volume of 166 pages which fits comfortably into the pocket, Professor Baker has summarized his vast knowledge of Illinois land snails; the chapters include one on "what they are and where they live", keys to the families and other keys where needed, a concise description of each family, genius, species and variety, and for each species a drawing of the shell, description, both of shell and animal, and a statement of its range.

The fieldbook is written throughout in non-technical language without sacrificing clarity or scientific accuracy. There is a section on introduced species and one on doubtful records and a good bibliography and index.

The author needs no introduction to Canadian malacologists. He has long been interested in our Mollusca and this interest is reflected in his work: the Monograph of the Lymnaeidae of North and Middle America (1911), his Freshwater Mollusca of Wisconsin (1928) which is indispensable to Canadian workers and other papers published in Canada by the National Museum of Canada and *The Canadian Field-Naturalist.*

The importance of this fieldbook for Canadian naturalists will appear from the following statistics: The fieldbook records 122 forms for Illinois; of these 73 are found in Eastern Canada; approximately 120 species and varieties of land snails are known for Eastern Canada; of these only 38 are not included in the Fieldbook (since they do not occur in Illinois) which means that fully two-thirds of our land snails are described and illustrated in Baker's work. If from these 38 forms we subtract local varieties such as *Anguispira kochi roseoapicata, A. kochi strontiana, Polygyra albolabris goodrichi* and *P. profunda strontiana,* found only on islands in Lake Erie, and introduced species of restricted distribution (*Arion hortensis, Oxychilus alliarius* and *Pomatia aspersa*) the proportion is nearer three-quarters than two-thirds. —A.L.

TROUT STREAMS. *By Paul R. Needham Ph.D.; Comstock Publishing Company, Inc., Ithaca, New York, 1938; pp. 233, fig. 74. $3.00.*

"Trout Streams" is a splendid source-book of well presented information, on trout as well as on streams. Most naturalists number many anglers amongst their aquaintances, whether they themselves angle or not, and have assisted at discussions on the future of angling in which a reference book, telling what sort of creatures trout are and what living conditions they require, would have been appreciated. Dr. Needham discusses, in order, the fish, physical and chemical conditions of streams, animal life of trout streams, trout food, propagation, stocking and protection, and stream and lake management. The angler is shown how the biologist arrives at his conclusions regarding the management of a stream or lake.

Regarding the common practise of "planting" fish without any sort of preliminary biological investigation and by persons with a minimum

of scientific information, the author writes—"What has been the result today of this system (or lack of system)? The most important evil has been the mixing of incompatible species: warm-water predacious fish such as bass, perch, pike, etc., in trout waters; Loch Leven in rainbow or eastern brook trout waters; lake trout in cut-throat waters, etc.; so that today many lakes and streams contain heterogeneous mixtures of both non-native and native forms. These misguided introductions have so upset the balance of nature in many waters as to ruin almost completely the sport-fishing in them."

"Trout Streams" is a contribution to the education of a generation of anglers who will insist on fisheries management that is biologically sound.—C.H.D.C.

PROTOZOOLOGY. *By Richard Roksabro Kudo, D.Sc.; pp. 689, fig. 291; Charles C. Thomas, Springfield, Ill., 2nd ed., 1939; $6.50 postpaid.*

This second edition of Kudo is larger by more than two hundred pages than its forerunner, and most of the figures are new. It is a thoroughly modern and solid text-book, with all phases of its subject covered by reference to publications of research workers. The general biology of protozoa is dealt with in the first six chapters, after which (chapters 7-43) representatives of all groups are discussed. Use of the book is facilitated by a splendid index, in which page references to the systematic discussion are printed in bold-face type. As a text-book and work of reference "Protozoology" lives up to everything claimed for it, but, in this reviewer's opinion, loses usefulness as a laboratory manual because of the complete lack of information on microscopy, staining, and culture methods. Perhaps the inclusion of such material would detract from the smoothness of the text, but in order to study protozoa one must have the information available somewhere.—C.H.D.C.

GOVERNMENT OF NORTHERN RHODESIA. A REPORT ON A FAUNAL SURVEY OF NORTHERN RHODESIA, *with especial reference to Game, Elephant Control, and National Parks, by C. R. S. Pitman. (Appendix XXIII, on the Native Fishing Industry, by J. Moffat Thompson); 1934; 7/6 from the Government Printer, Lusaka, or from the Crown Agents for the Colonies, 4, Millbank, London, S.W.1. pp. 500 with 11 maps and index bound separately.*

This report is one of the most fascinating government documents seen in a long time. The author, one of the leading field-naturalists of Africa, is Game Warden for Uganda, and carried out his survey of Northern Rhodesia under special instructions from the Colonial Secretary. The result is a splendid check-list of all vertebrate species known to inhabit the region, and a wealth of detail concerning those most important in wild life management which will aid greatly in the administration of this resource.

Those who, twenty years ago, freely predicted the early extermination of the larger African animals, overlooked an intangible but decisive factor, namely, the British conscience. The extermination of the African fauna was neither inevitable nor necessary, and over great areas of British Africa it simply was not permitted. Northern Rhodesia has an estimated population of one million wild ungulates. Some species, such as the two species of Lechwe are enormously abundant. Four, the Black Rhinoceros, Hippopotamus, Cookson's Wildebeest, and Yellow-backed Duiker, need special protection. Elephants are by no means scarce in British territory, and their capacity for crop destruction had administrators in a dilemma until Captain Pitman developed his "elephant control" policy in Uganda. If elephants are strictly protected in wild areas and persecuted whenever they damage cultivation they soon learn to behave. Thus the annual destruction of a number of elephants sufficient to cut their increase to reasonable proportions is carried out in such a manner as to give maximum protection to crops.

One interesting idea is that it is imperative for the government to preserve large herds of game to provide food for the natives in areas where tsetse-borne disease does not permit stock-raising. In many places in Africa the encroachment of desert conditions seems to have followed excessive grazing, and Nature's control of stock by "fly" may not have been entirely a curse.

An area is designated as suitable for a National Park, bearing in mind that full use of such a park lies in the future. It is stated, among other qualifications fitting it for a park, that this area has plenty of large carnivores to maintain a natural balance.

Sample items of interest;

"The Mushukulumbwe, in the vicinity of the Kafue flats, annually indulge in a great buffalo hunt, when a herd is driven into a selected swamp and dealt with mainly with primitive weapons. It is a man's game and no mistake, and this year (1932) I understand about 30

buffalo were killed and seven of the hunters. A certain quota of fatalities amongst the hunters is regarded as inevitable."

"*Fish Poisoning*—At least nine varieties of fish poison are known and there may be more . . . Very soon the fish are affected and float to the surface stupefied or dead, according to the poison used."—C.H.D.C.

In the Annual Report of the year 1937 of the Director of Gardens, Straits Settlements, Singapore, 1938, appears the following:

BOTANICAL MONKEYS

Toward the end of the year there were added to the collecting equipment of the Department two berok-monkeys (*Macacus nemestrina*), which were kept in the garden of the Assistant Curator's Quarters, Cluny Road, and the second Malay plant-collector, Ngadiman, was given charge of them.

The berok is the Coconut or Pig-Tailed Monkey which, as is well-known, is widely used in the East by Malays for gathering coconuts. The wild monkeys are caught as young as possible —so small even that they will sit in the hand; and they are trained gradually to twist young fruits off the coconut-inflorescences so that when they have grown strong enough they can climb the tallest trunks and drop the full-sized nuts from the crown. But it may not be so well-known that a few of these monkeys are taught also such other jobs as plucking mangoes or pulling bunches of rambutans from the orchard trees. It seemed possible, therefore, that a monkey so trained would solve even the botanist's problem of obtaining specimens from tall trees, palms and climbers the height of which rendered them inaccessible; for, if the tree cannot be felled—and to cut down a forest giant fot the sake of a few twigs is not merely costly but destructive—then one must employ a native climber or use a shot-gun, and both have their limitations. The berok is imperfect, too, because it cannot scale big trees unless there are climbers on it or small trees beneath by which it can ascend to the main limbs and overcome the long bole, but the experience of the last year has justified the idea that the berok offers the ablest assistance which the student of trees can have in the high forest. A berok upon the shoulder can be likened, in effect, to a falcon on the wrist; and its employment is recommended both to amateurs for its charm and cheapness and to keepers of Reserves where it is desirable to collect specimens repeatedly from the same trees without damage to them. It must be added that the berok is immune, moreover, to the irritation provoked by *rengas*-sap so that it enables one to collect specimens from these poisonous trees of the Mango-family, so abundant in the forest and yet, through avoidance, so little known.

When Mr. Corner was in Kelantan in April he was fortunate in finding a young berok which had been educated just as a botanist might wish. This monkey, called Merah, was brought to Singapore and after several weeks' training it complied with every expectation. On one occasion in Johore, for instance, it worked in the crown of a Wild Chempedak at the height of 170 feet: on another day it collected specimens from 24 trees, all of which were over 100 feet in height. At Fraser's Hill it obtained good specimens from five of the giant palms, *Caryota equatorialis*, which seem to have been collected only once before in Malaya, many years ago, and of which there were no specimens in the Singapore Herbarium: it revelled, too, in throwing down fruits from so many plants of a big climbing fig that it was discovered for the first time that the gall-figs of this species (*F. callicarpa* var.) were twice as big as the seed-figs and differently marked. Unfortunately this monkey developed an obscure illness at Fraser's Hill and, though it became a patient at the College of Medicine in Singapore, it had to be put away at the end of September. In its brief career, it had collected specimens from more than 300 different kinds of tree at negligible expense. The technique having thus been proved, the Malay plant collector, Ngadiman, was sent to Kota Bahru to find two more such monkeys and to learn how to train them and how to talk to them. After much difficulty he found the two young beroks, Jambul and Puteh, which were purchased by the Department and installed at the Botanical Gardens.

Now the method of collecting by these monkeys is this. They are kept on a string or, in the forest, they would run away. The string, which is 180 feet long, or more if need be, is wound on a wooden frame like a fishing line and is attached by a swivel to a collar round the monkey's neck. One speaks to the monkey in Malay, though in the present case it is "Kelantanese." "Gi ata" one says, and the monkey goes up the tree. Should it climb along a branch not intended, one shouts "Bukan itu, gi ata lagi"; and when it gets to the right branch "Belah itu" and along it the monkey goes. When it reaches the twigs to be collected, one jerks the string and shouts, "Ambil itu" whereupon the monkey pulls back and bites off

("repis itu") a twig and drops it clear. If more are needed, one shouts "Ambil lagi" and the monkey will bite off as many as are wanted. When it has finished, one cries "Turun" and the monkey comes down. But should any twigs in their fall have been caught up among the lower branches the monkey will have noticed and then one says "Turun, pelepas itu" whereon the monkey finds the quickest way to the twigs, lifts them up and drops them clear as many times as may be necessary. A well-trained monkey, when it reaches the ground, picks up the twigs and puts them into one's hand. The twigs which they gather are generally so ample that each can be divided into three or four herbarium-specimens: they do not pull off the flowers or fruits but break off the whole twig from behind the leaves. In the case of trees which flower from the branches, such as durians and wild nutmegs, some patience is needed to teach the monkey to rip the flowers from the branches after having collected the twigs, but as soon as the idea is grasped a rain of blossom descends.

It will be obvious that these monkeys delight in what they are doing: and the more one speaks to them, using the same words, the more they understand. After some practice in the jungle, they do not have to climb every tree but by a series of shouts and jerks on the string and pointing and slapping of trunks they can be induced to free their strings and leap from bough to bough so that they can visit numerous trees before they are obliged to come down for a drink of water. Further, the more practice they get, the more they understand what is wanted and they drop down any arresting objects such as opening buds, flowers, fruits and galls which are invisible from below: indeed, to work with a clever berok in the jungle is like fishing in the tree-tops. At the end of his days, Merah was able to find in the trees flowers and fruits which had been shown to him on the ground: and he knew the meaning of 18 words of Malay. The present pair are by no means so accomplished. They have a vocabulary of only 12 words but they are younger and the one, Puteh, is full of promise. As for their strings becoming tied up through entanglement in the branches or in the stems of climbers, there need be no fear: there is hardly a knot which they cannot undo and once it is loose they pass their bodies through the coils by pulling on the string and following their chins: if need be, they dangle by their necks.

By the end of the year, both monkeys had done considerable work in Bukit Timah Forest Reserve whither the one or the other had been sent every day. The specimens, which they obtained, have already repaid their cost of purchase, the price of such monkeys being about $25. It seems that these two must be congratulated, moreover, on being the first apes to enter Government service.

CHRISTMAS BIRD CENSUS

The Bird Census Committee wishes to remind any interested readers to take a Christmas Bird Census on some day between December 20th and 28th and send a report of it to the Editor as promptly as possible. On account of restricted space available for publication of such reports, Council has, by resolution, expressed the view that these reports should be published only in reduced form, restricted to recording essential information. The Christmas Bird Census reports published in *The Canadian Field-Naturalist* for February, 1939, are examples of this form. Contributors of Bird Census reports will save much unnecessary editorial revision if they will submit reports prepared in conformity with this resolution of Council.

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